THE

ENTOMOLOGIST'S MONTHLY MAGAZINE

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VOLUME LXV.

[THIRD SERIES.—VOL. XV.]

'J'engage donc tous à éviter dans leurs ecrits toute personnalite, toute allusion dépassant les limites de la discussion la plus sincère et la plus courtoise.'—*Laboulbène.*

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CONTENTS.

PAGE

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CONTENTS.

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CONTENTS.

CONTENTS.

PAGE

CONTENTS.

CONTENTS.

DESIDERATA.

Records of Aculeate Hymenoptera from Cambridgeshire and Dorsetshire.—G. M. SPOONER, The Brown House, Cranford Avenue, Weymouth.

CONTENTS.

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W. H. THORPE, from Zoological Laboratory, Cambridge, to Imperial Bureau of Entomology, Farnham House Laboratory, Farnham Royal, Bucks.

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THE
ENTOMOLOGIST'S MONTHLY MAGAZINE

VOLUME LXV.

[THIRD SERIES, VOLUME XV.]

A NEW *COLEOPHORA* OF THE RUSH-FEEDING GROUP

BY E. G. R. WATERS, M.A., F.E.S.

Coleophora tamesis, n. sp.

Antennae about ¾; basal joint somewhat thickened; ochreous-whitish, thickly ringed with ochreous or fuscous from beyond basal joint to apex, the rings occasionally reduced to spots on the underside. *Labial palpi* with terminal joint slender and finely pointed, more than half the length of the second joint; ochreous-whitish. *Head* ochreous, paler on sides. *Thorax* ochreous. *Forewings* ochreous, sometimes mixed with light fuscous in the interneural spaces towards apex; costa, margins of cell, costal and terminal veins, submedian fold and dorso-terminal margin marked with whitish lines, sometimes obscure or obsolete on dorsal half of wing; *cilia* ochreous-grey. *Expanse* 12–14 mm. *Hindwings* grey; *cilia* about 4, ochreous-grey. *Underside forewings* grey, apex suffused with ochreous; a fine whitish line along costa from near base; costal and apical cilia ochreous, terminal cilia ochreous-grey, ochreous at base; *hindwings* grey, apex suffused with ochreous, cilia ochreous-grey, ochreous at base on costa towards apex. *Abdomen* grey; *anal tuft* in both sexes ochreous or ochreous-whitish. *Legs* ochreous-whitish, grey on outer sides. (Described from thirty-seven specimens. The type, a male, has been deposited, together with a female, in the Oxford University Museum, Hope Department.)

Habitat: ENGLAND: Oxfordshire: Binsey, near Oxford, since 1914; Otmoor, 1928.

The principal known locality for this insect is a short stretch of water-logged ditch and the adjacent portion of a meadow; it is in Oxfordshire, though on the right bank of the Thames. A narrow tow-path alone separates it from the river, the proximity of which is commemorated in the proposed name. It is a spot remarkably rich, considering its small extent, in both plants and insects; in particular, it is the chief or only surviving locality near Oxford for quite a number of river- or fen-loving Micro-lepidoptera. May it long escape the 'improvements' which the Thames Conservancy is inflicting on the riverside a short distance away! Two damaged examples of the *Coleophora* here described, captured at Binsey on July 1st, 1914, and June 21st, 1915, respectively, have long been in my collection; they were placed among specimens of *C. galactaula* Meyr. (erroneously identified, till this year, with *C.*

alticolella Zell.[1]), but with some misgiving on account of their large size and yellowish colouring. It was not till June 10th, 1925, that I found similar moths abundant in the same locality, flying freely in evening sunshine, and realized that they were probably a species distinct from *galactaula*. A few days later Mr. O. W. Richards accompanied me to the spot and collected specimens for an examination of the genitalia; this enabled him to declare without hesitation that the moths belonged to the rush-feeding group of *Coleophora*, but were distinct from any known species. Since 1925 the new species has been seen there repeatedly, though not in the same abundance. On July 12th, 1928, I captured specimens in another locality over six miles distant from the first, along a wet ditch crossing the ancient swamp (now drained) of Otmoor; Mr. Richards has kindly identified some of these by examining the genitalia.

The genitalia show *C. tamesis* to be closely allied to *C. murinipennella* Dup., which it resembles in size (though larger on the average) and in the conspicuousness of the whitish streaks on the forewings. But there is no danger of confusing these two species, the ground-colour of *murinipennella* being always definitely grey, that of *tamesis* always ochreous. It was less easy to detect any superficial character which would separate *tamesis* with certainty from *C. galactaula*. *Tamesis* is considerably larger on the average, its expanse being hardly ever less than 12 mm., whereas normal examples of *galactaula* have an expanse of 10-11 mm. The ground-colour of *galactaula* is often greyish, whereas that of *tamesis* is always clear ochreous. But *galactaula* occasionally attains an expanse of 12 mm., and is sometimes ochreous with no grey tinge. I therefore submitted a series of each species to Mr. Meyrick, who with his wonted helpfulness and acumen pointed out that there was a constant difference in the structure of the palpi. Whereas in *galactaula* the terminal joint of the palpi is short and rather blunt-pointed, less than half the length of the second, in *tamesis* the terminal joint is slender and fine-pointed, more than half the length of the second. *Tamesis* flies later than *murinipennella*, which is a May insect, and earlier than *galactaula*, which only begins to emerge in late June; nevertheless it overlaps with *galactaula*, being still common enough in July. In 1927, owing perhaps to the exceptionally cold summer, *tamesis* was still on the wing, in small numbers, as late as August 6th.

An apology is perhaps needed for thus describing a new species

[1] Cf. E. Meyrick in 'Entomologist,' LXI (1928), p. 91.

of *Coleophora*, especially one belonging to the obscure group of rush-feeders, without some account of its early stages. Seeing how restricted its habitat is, I fully hoped and expected to find the case-bearing larva and rear the moth before introducing the species as new.[2] Unfortunately my repeated searches at different times of the year have been unsuccessful, and the early stages remain unknown. In the Binsey locality the only species of *Juncus* at all plentiful is *J. articulatus*; *Coleophora* larvae are not uncommon there on this plant, but have produced *C. galactaula* only. *Juncus compressus* is present, but is too irregular in appearance and scarce to be the food-plant. Another possibility is *Luzula campestris*, which, however, is difficult to find after the spring and seems to be grazed off by cattle. Mr. Meyrick suggests that *tamesis* is likely to be a *Luzula*-feeder (like *C. sylvaticella* Wood and *murinipennella*) on account of its relatively large size, the *Juncus*-feeding species being necessarily restricted in size by the conditions of their larval stage. The unusually long ovipositor doubtless bears some relation to the food-plant. Pending the solution of this mystery, it has been thought desirable to give the species a name, so that it may figure in a forthcoming list of the Micro-lepidoptera of the Oxford district.

184 Woodstock Road, Oxford.
December 8th, 1928.

THE GENITALIA OF *COLEOPHORA MURINIPENNELLA* DUP. AND ALLIED SPECIES.

BY O. W. RICHARDS, M.A., F.E.S.

PLATE I.

I have been asked by Prof. E. G. R. Waters to give some account of the genitalia of the new species of *Coleophora* he describes (*ante* p. 1), and I have taken the opportunity to figure these structures in two allied species.

Although *C. tamesis* Waters is superficially so like *C. galactaula* Meyr., the genitalia show it to be much more closely allied to *C. murinipennella* Dup. Dr. Wood (Ent. Mo. Mag., Vol. XXVIII, pl. 4, figure not numbered), has figured the genitalia of a moth he calls *C. murinipennella* Dup., but the structures shown in his plate are quite unlike any *C. murinipennella* Dup. I have examined, and appear to represent some quite distinct, presumably undescribed, species. The figures in the present paper (figs 1 and 4) have been prepared from specimens in Wood's own collection, now on loan at the British Museum (Natural History).

[2] Cf. Ent. Mo. Mag., LXII (1927), p. 102

Evidently the actual specimen Wood figured was a different species which through some mischance had been included in his series, for specimens from Oxford which have the habits of *C. murinipennella* Dup. (as described by Wood) agree in structure with the specimens here figured.

It will be noticed that *C. tamesis* agrees with *murinipennella* in the male in the peculiarly toothed supports of the oedeagus, which is very broad, but the species differ considerably in the shape of the clasper and in the number and shape of the eversible spines attached to the vesicle. The females, also, agree in the structure of the eighth sternite, but in *C. tamesis* the mouth of the duct of the bursa copulatrix is much wider.

C. galactaula Meyr. in each sex is very different from the two preceding species. Two specimens are figured to show the variation in the shape of the mouth of the bursa-duct. That illustrated in fig. 6 resembles Wood's figure (loc. cit., pl. iv) fairly closely but, as is shown in fig. 7, the mouth may often be much more widely open, all intergradations occurring. There is also a certain amount of variation in the proportions of the length and breadth of the eighth sternite.

EXPLANATION OF PLATE I.

FIG. 1. Genitalia of ♂ *C. murinipennella* Dup., seen from below. Specimen from the Wood collection.

FIG. 2. The same of ♂ *C. tamesis* Waters.

FIG. 3. The same of ♂ *C. galactaula* Meyr. (hairs of the apical part of the claspers not shown).

FIG. 4. The ovipositor and eighth sternite of ♀ *C. murinipennella* Dup , seen from below. Specimen from the Wood collection.

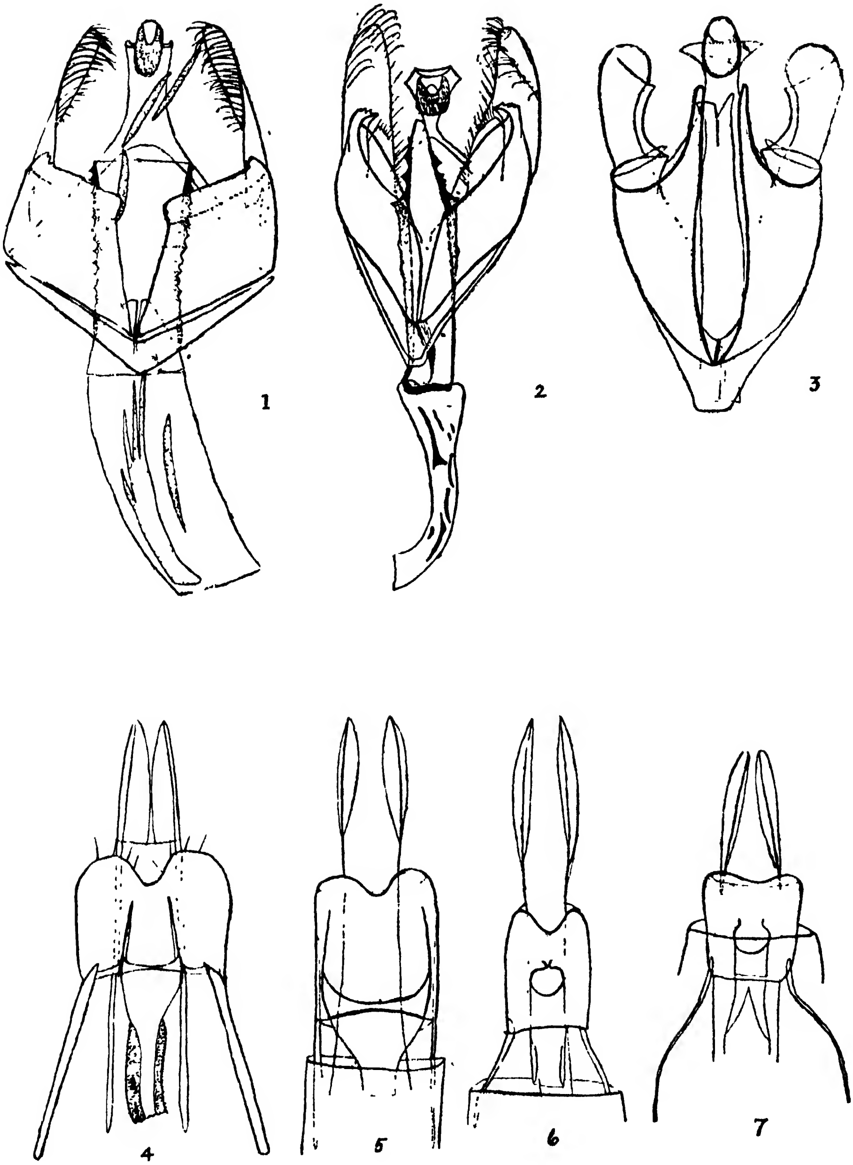
FIG. 5. The same of ♀ *C. tamesis* Waters.

FIG. 6. The same of ♀ *C. galactaula* Meyr. Specimen from Tubney, Berks.

FIG. 7. The same. Specimen from Cothill, Berks.

Dept. of Entomology, Imperial College of Science and Technology
December 11th, 1928.

The Occurrence of Dinoderus bifoveolatus Woll. in Britain.—Commander Walker tells me that *Dinoderus bifoveolatus* Woll. has not hitherto been recorded as occurring in Britain. In October last Mr. R. C. Oates brought me a few specimens for identification, there being some doubt as to the species. They were occurring in vast numbers in flour which had been stored for some years in one of the Liverpool warehouses, but unfortunately the place had been fumigated before the interest of the beetles was realised, and larvae or additional specimens of the adults could not be obtained. It is, of course, a well-known pest of grain and flour in other parts of the world. For a discussion of this and allied species readers may be referred to Donisthorpe's note in the Ent. Rec., XII, p. 16 (1900).—F. LAING, Brit. Mus. (Nat. Hist), S.W.7: *December 4th*, 1928.



GENITALIA OF COLEOPHORA

O. W. R. del

ATHETA (*COLPODOTA*) *OBFUSCATA* Gr. (M. & R.), A VALID SPECIES AND AN ADDITION TO THE BRITISH LIST OF COLEOPTERA.

BY B. S. WILLIAMS.

Atheta obfuscata Gr., as understood and described at great length by Mulsant and Rey, so very closely resembles the well-known *A. pygmaea* as to render a separate description unnecessary here. Apart from the well marked differences of the dorsal and ventral plates of the 6th free segment of the hind-body—which are described below—the external differences of the two species are very slight, and for diagnostic purposes, of doubtful value: however, as these differences exist it is as well to mention them, though their comparative and feeble nature must be strongly emphasised. *A. obfuscata* has a more shining appearance, the apex of the hind-body more highly coloured, the thorax more transverse with more pronounced posterior angles, paler coloured maxillary palpi, and the two black setae of the middle tibiae less strongly developed.

Fortunately, in both sexes, the formation of the two plates of the 6th free segment of the hind-body gives a definite and reliable character for the separation of the two species. In the male of *A. obfuscata* the apical edge of both dorsal and ventral plates is truncate (in one of my specimens the apical edge of the dorsal plate shews a trace of wide emargination, but the curvature is very feeble), whilst the male of *A. pygmaea* has the apical edges of the corresponding plates rounded. The female of *A. obfuscata* has the apical edge of the dorsal plate of the 6th free segment of the hind-body truncate, and the apical edge of the corresponding ventral plate plainly emarginate: in the female of *A. pygmaea* both edges are rounded as in the male.

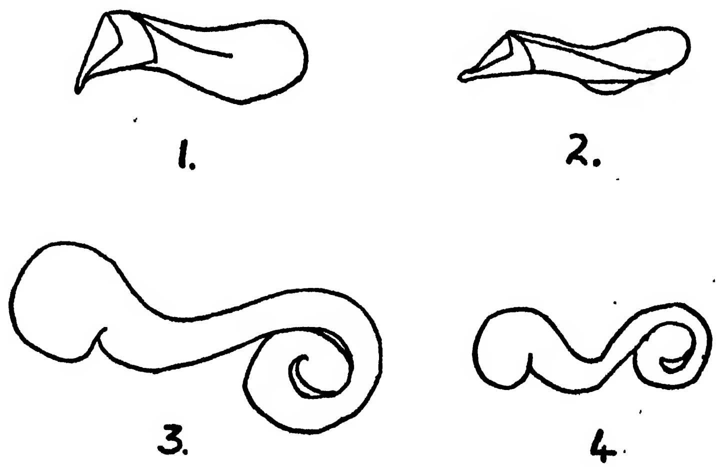
The two species shew considerable and important differences in the internal sexual organs. In the males, the aedeagus of *A. obfuscata*, compared with that of *A. pygmaea*, has the median lobes much wider and of a different shape, the lateral lobes are almost twice as broad, and the whole organ is of a stronger texture and more highly chitinised. Figs. 1 and 2 show the median lobes of both species as seen laterally. In the females, the spermatheca of *A. obfuscata* (Fig. 3) is a considerably larger and more developed organ than that of *A. pygmaea* (Fig. 4). In the camera lucida figures given the spermathecae are more highly magnified than the median lobes.

A. obfuscata has been sunk as a synonym of *A. pygmaea* in the European Catalogue of Heyden, Reitter & Weise (1906); also in

the Palearctic Catalogue of Winkler, now in the course of publication, and by all authors except Mulsant et Rey (Brévipennes, Aléochariens III, pp. 188 *et seq.*), who, though giving a very long and detailed description, make no mention of differences of the internal sexual organs, which in themselves are quite sufficient to warrant *A. obfuscata* being accorded specific rank. As Col. Deville points out (*in litt.*), 'Gravenhorst's descriptions are a little indefinite and do not afford any grounds of decision.' So in order to prevent confusion it is desirable to accept the determination of Mulsant et Rey of Gravenhorst's species as being correct.

In Britain *A. obfuscata* appears to be a much rarer species than *A. pygmaea*. Three specimens only have occurred to me: they are—one example from flood refuse, Hurn, Hants, 10.xi.1926, and a male and female from a mole's nest near Harpenden, 20.iv.1928. Col. Deville informs me he has found in his collection numerous specimens (chiefly from Northern France) mixed with *A. pygmaea*.

In conclusion, I have to express my indebtedness to Col. Deville for his kindness in determining *A. obfuscata* for me and for his help in other directions: also to Mr. J. H. Keys for his kind assistance.



EXPLANATION OF FIGURES.

Atheta obuscata Gr. (1) Median lobe of aedeagus (lateral view).
(3) Spermatheca.
Atheta pygmaea Gr. (2) Median lobe of aedeagus (lateral view).
(4) Spermatheca.

15 Kingcroft Road, Harpenden.
November 29th, 1928.

EMBIOPTERA FROM BAGHDAD.

BY P. ESBEN-PETERSEN.

[NOTE.—The material from which two species of Embioptera are described below was collected by me in Baghdad during the summer of 1928. Only specimens of the winged male sex were obtained, since all that were taken flew to electric light on various occasions between sunset and about 11 p.m. They were captured in the city of Baghdad in July and early August, at the residential suburb of Alwiyah (about three miles south), between August 10th and 22nd, and at the Government Farm, Rustam (about ten miles south) during June. *Oligotoma mesopotamica* was much the more common of the two. Several examples of this species would sometimes make themselves conspicuous on the white cloths of dinner-tables in gardens at Alwiyah during a single evening. The two species are easily distinguishable in life. *Oligotoma mesopotamica* is much smaller and gives the impression of a slender, almost uniformly dark brown, insect. *Embia persica* is much larger, and on casual inspection appears a robust form, with a reddish prothorax contrasting with the dark brown of the hind body.

Dr. P. A. Buxton tells me that two or more species of this Order were quite common in Mesopotamia during the War, but he does not think that any were recorded in the various publications based on collections of insects made at that time.—HUGH SCOTT.]

Embia persica McLachlan.

McLachlan, Journ. Linn. Soc. Lond., xiii, p. 382, 1877 (Sharud, North Persia).

H. A. Hagen, Canad. Entomol., xvii, p. 192, 1885.

G. Enderlein, Collections Selys, Embiiden, p. 38, 1912.

Blackish-brown, and brownish haired. Head subquadrate, only a little longer than broad and almost truncate behind; hind angles slightly rounded. First and second segments of labial palpi short, each of them as broad as long, third segment stout, as long as the first and second together. First and second segments of maxillary palpi also short, each of them as long as broad; third segment almost twice as long as broad; fourth and fifth each three times as long as broad. Antennae as long as head and thorax together, at least 24-segmented. First antennal segment stout; second, fourth and fifth only a little longer than broad; third, sixth and the following segments about three times as long as broad. All the segments of palpi and of antennae are brown, and with a narrow white ring at their tip. Prothorax small, subquadrate, hardly longer than broad; a transverse furrow one-third from the front margin. Abdomen brown, paler below; apical tip darker. Legs brown. Venation

brown; Sc and R_1 dark brown; all the longitudinal veins broadly brownish shaded; the subcostal area dark brown.

Body 11-12.5 mm.; forewing 8-9 mm.

Loc. Baghdad (H. Scott); three male specimens (in alcohol).

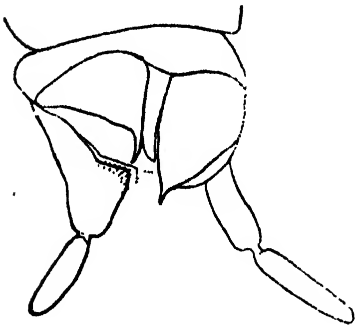


Fig. 1. *Embia persica*, ♂. Anal appendages seen from above.

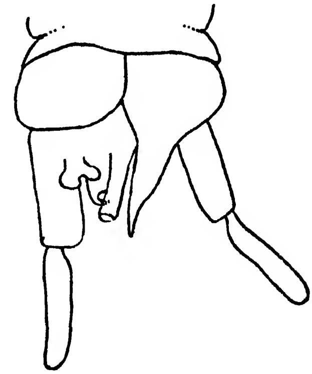


Fig. 2. *Oligotoma mesopotamica*, ♂. Anal appendages seen from above.

It is with much hesitation that I refer these three specimens to *Embia persica*, the type-material of which is in McLachlan's collection. As far as I can tell, McLachlan made his description from dried material, and he did not give any description of the anal appendages of the male. He mentions that the material is of the female sex, but was doubtless mistaken, as also H. A. Hagen supposes, and as Enderlein states. The differences between McLachlan's description and my notes may be partly due to the different condition of the material. But if a further comparison of the material here dealt with and McLachlan's type-material should substantiate the existence of two different species, I should like to propose the name *Embia scotti* for the new species.

Oligotoma mesopotamica, n. sp.

Brown, and brownish haired Head rectangular, one and a half times longer than broad and almot truncate behind; hind angles slightly rounded. Labrum pale; tip of maxillae dark brown; palpi and antennae brown; each segment with a narrow pale ring at its apex. Basal antennal segment rather stout, but hardly as long as the third; second segment short and as broad as long; fourth, fifth and sixth longer than broad; third, seventh and the following segments much longer than broad. Antennae as long as head and thorax together, at least 19-segmented. Prothorax with a deep transverse furrow one-fourth from front margin. Abdomen light brown above, paler below. Legs pale brown. Wings long and slender; venation brown, especially Sc, R_1 and Cu_2, which are dark brown and very conspicuous; the membrane is smoky brown, with narrow hyaline areas running between the main veins; most of these are how-

ever only slightly indicated. Subcostal area dark brown. R2+3 distinct, R4+5 only distinct for a very short distance from its origin. Between R1 and R2+3 five distinct cross-veins.

Body 6-8 mm.; forewing 5-5.5 mm.

Loc. Baghdad (H. Scott); twenty male specimens (in alcohol).

Silkeborg, Denmark.
November 4th, 1928.

THE BRITISH SPECIES OF *LESTREMIA* AND ALLIED GENERA (DIPTERA, CECIDOMYIIDAE).

BY F. W. EDWARDS, F.E.S.

(*British Museum, Natural History.*)

Lestremia is one of a small group of genera which are distinguished from other Cecidomyiidae by having retained the primitive character of a forked median vein.* The genera of this group may be distinguished from Sciarinae by the absence of tibial spurs and from Scatopsinae (at least the British species) by the 3-4 segmented palpi. The species are apparently few in number and more clearly defined than most others in the family Cecidomyiidae, but they have been very inadequately studied in Britain or elsewhere. The following notes are offered as a contribution towards the elucidation of the British species.

The genera of the subfamily Lestreminae were revised by Enderlein in 1911 (Arch. Naturg. Suppt. Bd. 1); in this revision Enderlein included the genus *Anarete*, agreeing with the opinion long ago expressed by Haliday that this genus was closely related to *Lestremia*, although Kieffer as lately as 1906 had refused it admission to the Cecidomyiidae and placed it in the Bibionidae near *Scatopse*. My own examination of the material convinces me that Haliday and Enderlein were right in their opinion regarding *Anarete*, as the whole morphology of the insect, including the structure of the hypopygium, is closely similar to *Lestremia*. On the other hand Enderlein included in his tribe Lestremini three genera which do not properly belong there: *Zygoneura* belongs unquestionably to the Sciarinae, and so apparently does *Gephyromma*; *Psectrosciara* is a Scatopsid.

The latest revision of the group is that of Felt, in his key to the Cecidomyiid genera of the world (Bull. N.Y. State Mus., 257, 1925), where seven genera of this group are distinguished. Felt however was evidently unacquainted with Enderlein's revision, and some of his genera are synonyms, as indicated in the

* All the Cecidomyiidae with forked media hitherto described belong to the group of Lestremiinae here discussed. I am acquainted, however, with a species belonging in or near the genus *[illegible]* which has a faintly forked media; this differs from the Lestremiinae in the very short basal segment of the tarsi.

notes below.* My conclusions in this matter were confirmed by the examination in Ithaca last August of a number of Felt's types; for the opportunity of seeing these I am indebted to Dr. Glasgow of Albany, N.Y.

Two genera of this group have not yet been found in Europe. Of these *Tritozyga* Lw. is distinguished from all the four dealt with here in its venation: *Rs* and the stem of the median fork both arise close to the base of the wing, and the strong *Cu* 1 is continued right to the base. According to Felt's figure of the type of *T. sackeni*, this genus suspiciously resembles the Scatopsid genus *Psectrosciara* in venation, and may belong to the Scatopsidae. *Konisomyia* Felt (which I have not seen) would seem to resemble *Tritozyga* in its essential features.

The fossil genus *Litomyza* Scudder perhaps belongs to this group of the Cecidomyiidae, but is recognisable from the published figure. Scarcely anything is known regarding the biology of the species, but it is probable that they are all saprophagous in the larval stage.

The four European genera are distinguished thus:—

1. Costa reaching wing-tip and produced beyond tip of *Rs*; *R*1 long; median fork short 2
   Costa not nearly reaching wing-tip and ending abruptly at tip of *Rs*; *R*1 short; median fork long 3
2. Wing-membrane clothed with macrotrichia; antennae 16-segmented (♂) or 10-segmented (♀) .... *Catocha*.
   Wing-membrane with microtrichia only; antennae 8-segmented (♀). .... *Catarete*.
3. Wing-membrane with macrotrichia all over; antennae 16-segmented (♂) or 11-segmented (♀) .... *Lestremia*.
   Wing-membrane with macrotrichia at the tip only; antennae 8–10 segmented .... *Anarete*.

Catocha Hal.

(N. Syn.: *Neocatocha* Felt 1912).

Wings with macrotrichia all over the membrane. *Rs* practically reaching the wing-tip, and costa produced beyond the tip of *Rs*. *R*1 long. Median fork shorter than its stem, sometimes much shorter. *Cu*1 apparently arising from basal section of *M*. Antennae of ♂ long, 16-segmented, flagellar segments verticillate and with distinct necks; of ♀ much shorter, 10-segmented.

Felt does not seem to have considered the possibility that his *Neocatocha* was simply the female of *Catocha*, notwithstanding the fact that a 10-segmented antenna in the female is implied in Haliday's original description, and figured by Walker. *Mimosciara* Rond. is probably to be regarded as a synonym of *Catocha* and not of *Lestremia* as commonly quoted.

C. latipes Hal. (? *molobrina* Rond.; ? *crassitarsis* v.d. W.). Recorded by Haliday from Belfast, and apparently not found since.

I took a ♀, Ippollyts, Herts., 13 x. 1917. In this specimen the median fork is hardly more than a quarter as long as its stem, whereas in Walker's figure it is about three-quarters as long; in the description however the median is stated to be 'forked near the tip,' and I therefore assume that the figure of the ♂ is inaccurate.

CATARETE gen. n.

Wings devoid of macrotrichia *Rs* practically reaching wing-tip, but running nearer costa than in *Catocha*. Costa produced beyond wing-tip of *Rs*. *R*1 long. Median fork much shorter than its stem. Antennae of ♀ 8-segmented, last segment bristly at tip. Empodium small.

Type, *Lestremia brevinervis* Zett.

I examined Zetterstedt's type in 1923 and have seen no other specimen. Haliday took a specimen at Cork which Walker doubtfully recorded as this species; confirmation of its occurrence in Britain is desirable.

LESTREMIA Macq.

(Including *Anaretella* Enderlein 1911 = *Neptunimyia* Felt 1912).

Wings with macrotrichia spread more or less densely over most of the surface. *Rs* ending well before wing-tip; costa not produced beyond tip of *Rs*. *R*1 short. Median fork much longer than its stem. *Cu*1 more or less widely interrupted at the base. Eye-bridges three or four facets broad. Palpi long. Antennae of ♂ long, 16-segmented; all the flagellar segments except the last with long, bare necks, the swollen basal portion bearing three hair-whorls, the hairs in the middle whorl very long. Antennae of ♀ 11-segmented, flagellar segments with short necks and with only one distinct hair-whorl, placed near the base Tip of ♂ clasper pointed or toothed. Fourth tarsal segment longer than the fifth. Empodium in both sexes shorter than the claws. Claws in both sexes more or less obviously denticulate beneath.

No adequate descriptions have hitherto been published of the European species, with the exception of that of *L.* (*Neptunimyia*) *bromleyi* Barnes (Entomologist, August 1928), aad the interpretation of the existing names is a matter of some difficulty, especially as the types of Meigen and Macquart are lost. Three of our British species seem to conform reasonably well to those described by Winnertz (1870); the fourth I propose to treat as *L. cinerea* Macq. These four species fall into two fairly well-marked subgenera, as follows:—

Subgenus *Lestremia* s. str.

Vein *Cu*1 almost complete, only rather narrowly interrupted at base of wing. Branches of median fork practically parallel, the lower branch complete. Antennae of ♀ with the flagellar segments cylindrical, pubescent all over, without definite sense-organs; last segment constricted just before the tip, with a distinct apical hair-whorl in addition to the basal one. Male aedeagus conical, not bilobed at tip.

The constriction at the tip of the last antennal segment of the ♀ led Winnertz to give the number of segments as 2 + 10, but

there is no actual joint dividing off the nipple-shaped tip. Besides those mentioned below, only one other European species seems fairly well distinguished. This is *L. angustipennis* Strobl., which is said to have the stem of the median fork almost as long as the branches.

1. *L. cinerea* Macq. (? *carnea* Lw.; ? *declinata* Kieff.; ? *sylvestris* Felt).

Antennae in both sexes with the scape yellowish; flagellar segments in ♀ with short but distinct necks, in ♂ with necks of intermediate segments slightly longer than basal part. Thorax with slight but obvious grey pruinosity. Clasper of ♂ with two small, pale, terminal teeth, the outer smaller than the inner; side-piece without basal lobe. Wings broad, anal area bluntly right-angled. Stem of median fork curved, fork rather over twice as long as stem, branches slightly approximate beyond middle, and almost equally divergent from stem at base. Wing-length, about 3–3·5 mm.

I propose to fix Macquart's name to this species as it seems to be the commonest, although his description might apply to almost any *Lestremia*; his figure is obviously roughly diagrammatic, but as it shows *Cu* 1 running to the base of the wing we may assume it did not represent *L. defecta*. British material examined is from New Forest (*Sharp, Adams*), Cambridge and Elgin (*Jenkinson*) and Herts. and Beds. (*F.W.E.*), also speciments without data determined by Walker as *L. leucophaea*. Probably common everywhere.

2. *L leucophaea* (Mg.) Winn.

Antennae in both sexes with the scape yellowish. Necks of flagellar segments of ♂ rather longer than in *L. cinerea* (nearly one-third longer than basal portion) and those of ♀ rather more distinct. Thorax lighter brown in colour, without a trace of pruinosity, scutum slightly shining. Clasper of ♂ rather shorter and with only one terminal tooth; aedeagus longer and narrower than in *L. cinerea*. Wings with anal area less developed than in *L. cinerea*, slightly obtuse. Stem of median fork scarcely curved, lower branch almost continuing direction of stem, upper branch arched at base. Wing-length, about 2·5 mm.

Baldock, Herts., 1 ♂; Letchworth, Herts., 1 ♀ (*F.W.E.*); New Forest (*Sharp, Lamb*). In regard to wing-shape and venation these specimens agree rather closely with Winnertz's description of *L. leucophaea*, which he says is in conformity with a figure received from Meigen himself.

3. *L. fusca* (Mg.) Winn.

Antennae entirely black in ♀, scape sometimes brownish in ♂; flagellar segments in ♂ with necks scarcely as long as basal portions, in ♀ without distinct necks and rather shorter than in the last two species. Thorax blackish and somewhat pruinose. Male hypopygium almost as in *L. cinerea*, the clasper with two apical teeth. Wings with anal area little developed, even more obtuse than in *L. leucophaea*; venation as in *L. cinerea* except that stem of median fork is rather longer, being fully or over half as long as the upper branch. Wing-length, about 1·5–2 mm.

Letchworth, Herts.; Babraham, Cambs. (*F. W. E.*); New Forest (*Sharp*). Probably common everywhere.

Two slightly different forms, possibly distinct species, are distinguishable in the material examined: a larger form, with stem of media half as long as the fork, and a smaller form with stem of media two-thirds as long as the fork and anal area still more obtuse. The latter evidently approaches and may be identical with *L. angustipennis* Strobl.

Subgenus *Anaretella* End.
(N. syn.: *Neptunimyia* Felt).

Vein *Cu1* hardly extending back beyond bend of *Cu2*. Branches of median fork straight and divergent almost from base, lower branch faint or obsolete except at base and tip Antennae of ♀ with flagellar segments oval, the first seven without dense pubescence but with paired subapical sense-organs, each composed of 4–7 irregular branches, last two pubescent all over and without sense-organs, terminal segment not constricted near tip, without apical hair-whorl. Antennae of ♂ with sense-organs similar to those of ♀ on first 4–5 flagellar segments. Male aedeagus broader, bilobed at tip. Claws with more obvious serrations than in *Lestremia* s. str.

Only one European species is known, but others are recorded from N. America, W. Africa, and Samoa.

4. *L. defecta* Winn. (*bromleyi* Barnes).

Antennae with scape yellowish Necks of flagellar segments in ♂ rather shorter than basal portions. Thorax blackish or dark brownish, more or less pruinose, scutellum lighter. Male claspers without terminal tooth. Wings broad, anal area large and right-angled or somewhat acute, hind-margin rounded; venation as noted above. Wing-length, about 2·5 mm.

Letchworth and Hitchin, Herts.; Shefford, Beds. (*F. W. E.*); Norfolk (*Barnes*); Cambridge (*Jenkinson*); New Forest (*Sharp*). Probably common everywhere.

Winnertz gives a figure of the whole wing which shows the stem of the median fork very short, shorter even than *R1*, and Enderlein in erecting his genus *Anaretella* made this the principal diagnostic character. There is little doubt, however, that the figure is inaccurate, as the subsidiary figure given to show the venation indicates a fairly long stem to the median fork, as in British specimens. For the rest, our material agrees so well with the description that I cannot doubt the identity of the species.

ANARETE Hal.
(N. Syn.: *Microcerata* Felt, 1908; *Pseudanarete* Kieffer in Strobl, 1909; *Limnopneumella* Enderlein, 1911; *Limnopneuma* Enderlein, 1911.)

Wings without macrotrichia except at tip and sometimes a few along hind margin *Rs* ending well before the wing-tip; costa not produced beyond tip of

Rs. *R*1 short. Median fork much longer than its stem, branches even. *Cu*1 widely interrupted at base. Eye-bridges narrow, only 1–2 facets wide, and meeting in a point. Palpi rather short. Antennae short in both sexes, flagellar segments rounded without distinct necks and with short verticils only; 8–9 segments in ♂, 9–10 in ♀. Tip of ♂ clasper rounded and pubescent. Fourth tarsal segment shorter than the fifth. Empodium in ♂ often very large, in ♀ much smaller; claws in ♂ often with fine hairlike serrations on distal half, in ♀ quite simple and more curved.

Pseudanarete Kieff. (type *albipennis* Lw.) was proposed on the ground of imaginary differences in venation and antennae between *A. candidata* Hal. and *A. albipennis* Lw.; its retention is not justified.

Microcerata Felt (type *johnsoni* Felt) was said to be distinguished from *Lestremia* chiefly by the short antennae, with 'greatly enlarged' second antennal segment; Felt did not mention the hairiness of the wings, and was not aware of its relationship with *Anarete.* I have examined the type and cannot see that the second antennal segment is much larger than usual; the wings are hairy only at the extreme tip, and *M. johnsoni* appears to be a typical *Anarete.* Most or all of the other species referred by Felt to *Microcerata* also belong to *Anarete*, the only doubtful case being *M. texana*, which has the whole of the wing-tip hairy.

Limnopneumella Enderlein (type *stettinensis* End.) was stated to differ from *Anarete* in having the claws perfectly simple, Enderlein being unaware that this is normally the case in the females of *Anarete.*

Limnopneuma Enderlein (type *coracina* Zett.) was proposed for species with finely serrate claws, in case the type of *Anarete* (*candidata* Hal.) should prove to have simple claws. The distinction is too trivial for generic definition and is mainly sexual.

The four British species known to me all have the thorax shiny blackish; abdomen black; head and appendages blackish; legs brownish; halteres with dark knob. Two other European species are known which appear to be distinct from any so far found in Britain: *A. stettinensis* End. is evidently allied to *A. lacteipennis*, but is said to have the thorax 'gelblich graubraun'; *A. rubra* Kieff, is mentioned below under *A. angustata.*

1. *A. candidata* Hal. (? *albipennis* Mg.).

♂. Antennae only 8-segmented. Palpi 4-segmented, first segment slightly larger than the other three, which are subequal, 2–2·5 times as long as broad. Aedeagus bare at tip. First tarsal segment on all legs distinctly more than half as long as the tibia, and provided with rather conspicuous erect pubescence beneath. Empodium much longer than the claws and very broad. Claws simple. Wings broad, milk-white, all veins pale; branches of median fork

almost parallel, diverging at tip only, with few macrotrichia. Anal lobe large, acute. Hind-margin rounded. Wing-length, about 2·3 mm.

♀ Unknown to me, but mentioned by Haliday; his figure of the antennae probably refers to this sex, in which case it is 10-segmented (the basal segment is evidently omitted in the figure, so that Haliday counts only nine); legs said to be shorter than in the ♂

Dolgelley, N. Wales (*Verrall*); Ingleborough, Yorks., and Welwyn, Herts. (*F. W. E.*). The Dolgelley specimens have the hind tibiae and tarsi whitish, as stated by Haliday; in the others these parts are darker, but I do not see any other difference.

The figure in Walker's *Insecta Britannica* is inaccurate, *R* 1 being shown much too short.

2. *A. lacteipennis* Kieff. (*crassipalpis* Kieff., ♀; ? *albipennis* Lw.).

♂. Antennae 9-segmented. Palpi 4-segmented; first segment considerably swollen, with rather dense, short, flattened bristles beneath; second and third segments each about twice, fourth about three times as long as broad. Aedeagus with a pubescent membrane at tip. First tarsal segment on all legs barely half as long as the tibia, without obvious erect pubescence beneath. Empodium much longer than claws and very broad. Claws with a few fine hair-like serrations on outer half (very difficult to see even under a high power, unless the claws are exactly in side view). Wings milk-white; anterior veins darkened; branches of median fork divergent almost from the base, with more numerous and obvious macrotrichia than in *A. candidata*. Anal lobe large, acute; hind margin less rounded than in *A. candidata*. Wing-length, about 1·7 mm.

♀ Antennae 10-segmented. Palpi 4-segmented; first segment greatly enlarged, ventral patch of flattened bristles denser than in ♂; second and third segments hardly longer than broad, fourth less than twice as long as broad. Legs rather shorter than in ♂; claws quite simple, empodium much smaller than in ♂ and not much over half as long as claws. Wings as in ♂.

Newmarket (*Verrall*), 3 ♂; Cardington, Beds. (*F. W. E.*), 1 ♀. I think there can be no doubt that the differences in palpi and antennae are sexual only. Loew's description applies to this species except that he seems to suggest his type had only 3-segmented palpi (he describes the *second* palpal segment as swollen, but says the *first* is not clearly distinguishable). Possibly the last segment was broken off in his type, as sometimes happens. In any case the name *albipennis* is preoccupied.

3. *A. coracina* Zett. (? *pilipennis* Strobl).

♂ Antennae 9-segmented. Palpi only 3-segmented; first segment not enlarged and without patch of short, flattened bristles beneath; second segment under, third rather over twice as long as broad. Hypopygium and legs as in *A. lacteipennis*. Wings greyish, without milky tinge; rather narrower than in *A. lacteipennis*, but venation the same and anal lobe large and slightly acute. Wing-length, about 1·7 mm.

♀. Antennae 10-segmented. Palpi 3-segmented, shorter than in ♂, the second segment hardly longer than broad, first not enlarged Claws simple; empodium shorter than the claws.

Sharpham Moss, Bridgewater, Somerset, 7.ix.1925 (*Audcent*).

4. *A. angustata*, sp. n.

Blackish, including antennae and palpi; a small area round root of wing lighter; legs brownish. Thorax scarcely shining. Antennae 9-segmented in ♂, 10-segmented in ♀, of the usual form, last segment with apical half narrowed, at least in ♀. Palpi 4-segmented in ♂, first segment scarcely larger than second, which is about twice as long as broad; third slightly longer, fourth about twice as long as third. Palpi of ♀ (in the specimen mounted) only 3-segmented, first rather swollen, about twice as large as second, but without dense patch of bristles; second only about 1·5 times, third over three times as long as broad. Hypopygium much as in the other species; tip of aedeagus finely fringed with hair-like processes. First tarsal segment about half as long as tibia, rather shorter on front legs Empodium of ♂ not quite as long as claws, of ♀ about half as long. Claws quite simple in both sexes. Wings rather narrow, greyish, extreme base only whitish. Costa, as usual, ending before level of tip of *Cu*1. Branches of median fork divergent almost from the base. Anal area obtusely rounded, very little developed. Wing-length, about 1·3 mm.

Letchworth, Herts., vi. 1917, 2 ♂ (including type), 1 ♀; v. 1918, 1 ♀ (allotype); 23.v.1920, 1 ♂ (*F.W.E.*). All the specimens were taken on a window facing north-west. The species is evidently allied to *A. rubra* Kieff., but seems quite distinct, Kieffer describing his species as having the body largely red, mouth parts whitish, claws denticulate, and antennae alike in the two sexes, the flagellar segments gradualy diminishing in size.

British Museum (Natural History)
November 30th, 1928.

Xylobiops basilaris Say (*Coleoptera, Bostrychidae*)—*the Red-shouldered Twig-borer—in imported timber.*—During the work of the Entomology Section of the Forest Products Research Laboratory at Princes Risborough, Buckinghamshire, this Bostrychid beetle has been recorded from imported American timber twice during the past two months. In the first instance, a specimen of the beetle (identified by Mr. K. G. Blair, of the Natural History Museum) was taken in a timber yard on 3rd October, 1928, from American oak boards, in which it was found along with larvae and adults of *Lyctus* spp., in particular *L. parallelopipedus.* Material containing larvae of the insect brought to the Laboratory yielded several other specimens of the adult beetle during November, 1928. The second record of the occurrence of this beetle is from imported hickory, when it was found in 'blanks' used for the manufacture of pick and shovel handles. In the beginning of September, 1928, 'blanks' attacked by an insect were sent for report to the Forest Products Research Laboratory; the larvae present were those of a Bostrychid beetle, the species being identified when two adults of *Xylobiops basilaris* emerged in November in the Laboratory.

Since this insect is not a native of the United Kingdom, it is of special interest to note its occurrence and association along with *Lyctus* 'Powder-post beetles,' of which there are now three American species (*L. brunneus, L. planicollis* and *L. parallellopipedus*), to be found commonly in timber yards in this country. Felt (New York State Museum, Memoir 8, 1906), writing of *Sinoxylon basilaris* Say—(the Red-Shouldered Twig-Borer)—states 'that this small borer

is rather uncommon in New York State, although it has been recorded as breeding in the twigs of a considerable variety of trees, such as hickory, persimmon, mulberry, apple, peach and grape-vine. Dr. Hopkins states that it infests most other deciduous trees and that the larvae bore in solid wood. The species is probably generally distributed in the North Eastern States of America.' —RONALD C. FISHER (*Entomologist*), F. R. CANN (*Assistant Entomologist*), Forest Products Research Laboratory, Princes Risborough, Bucks: *November 28th*, 1928.

Note on Haliplus nomax B.-B., var. browneanus Shp.—An additional record for this variety in the Midlands has come to light. I took a single ♂ specimen on 27.viii.1926 in a small drain by the G.W Railway main line near South Hinksey, Berks. This is an unusual type of habitat for the species or this variety. They normally occur in large drains, canals or wide open spaces of water. This would probably account for only a single specimen having been taken. If it had been a ♀ specimen, I should have hesitated over putting it on record.

In my note in the E.M M. for December, 1928, pp. 275-6, referring to this variety, the words 'In North Devon it turned up at Coate Reservoir, near Swindon,' occur. It should have been North Wilts, not North Devon. I feel it is as well that this should be corrected at once, as I believe there are other Swindons than the Wiltshire one. I have not, as yet, found it anywhere in Devon.—E. J. PEARCE, 18 Milton Road, Swindon, Wilts: *December 5th*, 1928.

Isle of Wight Hemiptera.—A week spent in the Isle of Wight at the beginning of last September enabled me to add to my earlier lists (E.M.M. 1924, pp. 117-118, and 1927, pp. 41-42) several species which do not seem to have been recorded previously for the island (marked with an asterisk), and a number of fresh localities for the less common species.

HETEROPTERA: **Acanthosoma haemorrhoidale* L., quite plentiful in all stages on hawthorn, Bembridge and Brading; *Nysius thymi* Wolff, St. Helens; *Cymus claviculus* Fall., Merston; *Berytus minor* H.S., Culver Headland; *B. signoreti* Fieb., Culver; *Piesma quadrata* Fieb., St. Helens; *Physatochila dumetorum* H.S., Alverstone; *Calocoris roseomaculatus* De G., Bembridge; *Megacoelum infusum* H.S., plentiful on oaks, Bembridge; **Pseudoloxops coccinea* Mey., Bembridge; *Psallus roseus* F., Brading and Bembridge. HOMOPTERA: **Deltocephalus sabulicola* Curt., St. Helens; *Thamnotettix croceus* H.S., St. Helens; *Kelisia vittipennis* J. Sahlb., St. Helens; *Psylla costalis* Flor, Bembridge.—JAMES M. BROWN, 176 Carter Knowle Road, Sheffield: *November 26th*, 1928.

On the distinction of Pimpla clavicornis Thoms. and P. curticauda Kriech.—In May, 1927, I bred a ♀ Pimpla from the cocoon of a *Phobocampa confusa* Thoms. taken in the Devil's Glens, Co. Wicklow, during the previous July.* Its short terebra and clavate antennae made identification by means of Schmiedeknecht's table an easy matter, it 'running down' without hesitation to *Pimpla clavicornis* Thomson. Reference to Morley's Brit. Ichn., Vol. III, pp. 107-108, where Morley synonymises Thomson's species with the earlier described *Pimpla curticauda* of Kriechbaumer, necessitated a re-examination of my specimen, as Morley's diagnosis did not seem quite applicable to it. I had, however, no difficulty in clearing up the matter, because, in the collection of

* The *Phobocampa* larva had recently emerged from a full-grown larva of *Vanessa io* and had just spun its cocoon when captured.

Ichneumonidae in the National Museum, Dublin, is a ♀ *Pimpla curticauda* Kriech. from the collection of the late Dr. H. Braun's. Upon comparing this ♀ and my own with Morley's description, it became evident that his was a kind of hybrid diagnosis of *curticauda* and *clavicornis*. How Morley permitted himself to regard these two totally different species as synonymous is difficult to understand, unless he had not seen the genuine *curticauda*; his remarks at the foot of p. 108, *loc. cit.*, show clearly that his English specimens are referable, not to *curticauda* Kriech., but to *clavicornis* Thoms., and that the latter should replace the former species in the British list. *P. clavicornis* is a typical member of the subgenus *Itoplectes*, and but for the more clavate antennae and the shorter terebra of the ♀, might easily be overlooked as a black-bodied *P. maculator* Fab. or *P. alternans* Grav. The ♂♂ of *clavicornis* are still more likely to be passed over; but the antennae are distinctly more clavate than those of the two species just mentioned, and the stigma of the forewings is very pale testaceous, with a darker border beneath apically, which is quite distinct from that of *maculator*, though it resembles the stigma of *alternans*. Besides the above-mentioned ♀ *clavicornis* from the Devil's Glen, I have two ♂♂ also from Co. Wicklow—one taken amongst nettles at Rathdrum on 12th June, 1927, and the other bred from a cocoon* of *Macrocentrus abdominalis* (Fab.), on 31st July, 1926, from Kilmacanoge, near Bray, and a second ♀ captured at Kenure Park, Rush, Co. Dublin, on 26th June, 1922.

As pointed out by Morley (*loc. cit.*), *P. curticauda* Kriech. has filiform antennae (not at all clavate!), which are ferruginous beneath (not yellow!), and it is a much more robust insect than *clavicornis*. My Co. Dublin ♀ *clavicornis* and my ♂ from Rathdrum have been examined by Dr. Roman, who agrees that they belong to Thomson's species. *P. clavicornis* is evidently a rare or overlooked species, as Dr. Roman informs me that there are no specimens in either his own collection nor in that of the Riksmuseet in Stockholm. It would appear also, from the hosts of my two bred specimens, that it is not very particular in its habits and that it is most probably always a hyperparasite.—A. W. STELFOX, National Museum, Dublin: *November*, 1928.

Note on the black Croesus from Ireland.—As has been known for many years, there occurs in Ireland a *Croesus* with entirely black abdomen known as *C. stephensii* Newm. It has been suggested that this may be either a melanic form of *C. septentrionalis*, or a species peculiar to Ireland, or an introduced species from America, where—both not elsewhere in Europe—black species of *Croesus* occur. From a batch of *Croesus* larvae sent to me last autumn by Mr. A. W Stelfox, of the Dublin Museum, and collected in Co. Dublin, a series of specimens, partly melanic and partly typical, was bred during this spring. The larvae, found on birch, were all similar, and of the ordinary form for *septentrionalis*.

From the specimens I procured three broods of larvae.

(1) From ♂ and ♀ of typical form (but the actual pairing was not witnessed) there were bred eleven typical ♂ and eighteen typical ♀. One ♂ only, the first to emerge, was var. *stephensii*.

(2) From ♂ and ♀ var. *stephensii*, fifteen ♂ and twenty-nine ♀, all similar to the parents.

(3) From ♂ *stephensii* and typical ♀, which paired immediately in a glass-topped box, before they were sleeved out on birch, there resulted eleven ♂ *stephensii*, nine ♂ typical, twenty-four ♀ *stephensii* and four ♂ and

* One of a bunch of seven cocoons brought me by Mr A A Lisney: the other six each produced female *Macrocentrus abdominalis*

nineteen ♀ which are *stephensii* (except that slight traces of red may be observed in some) in dorsal aspect, but beneath the intermidiate segments are largely or considerably red, as in the typical form. No typical ♀ emerged from this large brood

A single female of the typical form which, no doubt, laid parthenogenetically, yielded a small number of typical male specimens only, but most of the larvae that pupated failed to emerge. I am very much indebted to Mr. Stelfox for supplying me with this interesting material.—R. C. L. PERKINS, 4 Thurlestone Road, Newton Abbot: *November 27th*, 1928.

Angioneura cyrtoneurina Zett., a Dipteron new to Britain, and other insects at Horning Fen.—On August 27th last I visited Horning, Norfolk, and at the village I got a man to put me across a waterway on to the island opposite the boat-houses, where I stayed for about three hours taking everything except obviously common insects. I tried specially for known Horning species, but the only beetles I got were *Stenus proditor* Er., *S. nitens* Steph. and *S. carbonarius* Gyll. These occurred at grass roots and in sedge refuse. Having spent what I considered a reasonable amount of work and time on this method of collecting, I tried beating and sweeping, and found insects of all kinds plentiful. I got a nice variety of *Melasoma* (*Lina*) *populi*) L., a small specimen with black thorax, wider at base than at front margin, anterior angles not produced or prominent, and devoid of the usual thick lateral margins and aeneous colour of typical specimens. It looked so strange that at first I failed to recognise it as *M. populi*. Curiously enough, it was the only specimen seen; if more had been found I should have been inclined to regard it as a local form and not an aberration. I took a good series of the Capsid bug *Adelphocoris ticinensis* Mey, seen alive by me for the first time. A few nice Homoptera were secured, the Cercopid *Aphrophora maculata* Edw., one only, in company with swarms of *A. alni*, and the usual Bythoscopids. *Pediopsis cereus* Germ., *P. virescens* Fall., *Idiocerus contusus* Flor, from sallow. The Jassids, *Paralimnus phragmitidis* Boh., *Cicadula septemnotata* Fln. and three specimens of the local Fulgorid, *Megamelus thoulessi* Edw., were taken

I also gave some attention to the Diptera, but only common large Syrphids, *Eristalis, Helophilus*, etc , were attracted to the *Angelica* flowers. I swept the Chloropid fly *Platycephala planifrons* F., which I had previously taken at Weston-on-the-Green, Oxfordshire. I recognised this fly on capture and worked for more. but found that it was decidedly scarce. A small Tachinid which I took here subsequently proved to be new to Britain, Mr. C. J. Wainwright having kindly determined the specimen as *Angioneura cyrtoneurina* Zett. ♂. The fly is about the size of the common *Morinia nana* Mg., but is easily known from that species by the simple arista of the antennae, the arista in *M. nana* being plumed. A full description of *A. cyrtoneurina* and a text-figure of the wing will be found in 'Diptera Danica,' part 7, p. 258. The cell of third and fourth veins of the wing is open, the fourth vein being gently rounded. The species is apparently rare in Denmark: 'We have only two specimens, both males' (Lundbeck).—J. COLLINS, Oxford: *November 23rd*, 1928.

Societies.

YORKSHIRE NATURALISTS' UNION: Entomological Section.

The Annual Meeting was held on Saturday, October 27th, in the Library of the Philosophical Society, Leeds, under the Presidency of Mr. J. M. Brown M.Sc., F L.S.

As in former years, the afternoon was devoted to an examination of the exhibits, amongst which were the following:—

COLEOPTERA. By Mr. M. L. Thompson: *Arpedium brachypterum* Grav., *Chrysomela fastuosa* Scop., *Otiorrhynchus muscorum* Bris., from the Cheviots; *Hydnobius punctatissimus* Steph., Eston-in-Cleveland; *Mantura obtusata* Gyll., Buttercrambe Wood, near York. By Mr. E. G. Bayford: *Micralymma marinum* Stroem, from Scarborough; *Lyctus brunneus* Steph. and *Phyllotreta nodicornis* Marsh., from the Barnsley district. By Mr. A. E. Winter: Photographs illustrating the life-history of *Geotrupes typhoeus* L., with detailed observations, some of which corroborated and others were at variance with those recorded by Fabre. One of these latter was that the nursery burrow was invariably about ten inches in depth, and not six feet, as stated by the French author. By Mr. J. R. Dibb: A number of species, mainly from the Leeds district, including *Diphyllus lunatus* F., from Doncaster. By Mr. T. L. Hincks: Cases of exotic species representing the genera *Stigmodera*, etc., from Australia and Madagascar, *Pachyrrhynchus* from the Philippine Islands, and *Rhinoscapha* and *Eupholus* from New Guinea. By Mr. J. M. Brown: *Batrisodes venustus* Reich., from Spurn; *Brachytarsus varius* F., Buttercrambe; *Aromia moschata* L., Cambridge.

HYMENOPTERA. By Mr. Rosse Butterfield: *Andrena ruficrus*, from Allerthorp Common. By Mr. J. R. Dibb: *Cimbex* (?) *femorata*. By Mr. E. G. Bayford: A species of *Thaumapus* bred from cells of a mason-bee fixed on the main stem of bananas from Jamaica. HEMIPTERA.—By Mr. J. M. Brown: A series illustrating the life-histories of *Tropicoris rufipes* L., *Palomena prasina* L., *Acanthosoma haemorrhoidale* L. and *Nepa cinerea* L. Specimens of less common species, including *Syromastes marginatus* L., *Chorosoma schillingi* Schml., *Corizus capitatus* F., *Metatropis rufescens* H.-S., *Microphysa elegantula* Baer, *M. pselaphiformis* Curt., *Lopus gothicus* L., *Loxops coccineus* Mey., *Ranatra linearis* L. By Mr M. L. Thompson: *Stygnocoris pedestris* Fall. and *Limotettix striola* Fall., from Eston-in-Cleveland; *Bryocoris pteridis* Fall., macropterous form, and *Calocoris alpestris* Mey., from Hawthorn Dene, Durham; *Deltocephalus ocellaris* Fall., the Cheviots.

ORTHOPTERA. By Mr. M. L. Thompson: *Panchlora viridis*, Danby-in-Cleveland, imported with bananas. By Mr. J. M. Brown: *Ectobius panzeri* Steph., *Nemobius sylvestris* F., *Labia minor* L.

PLECOPTERA. *Perla cephalotes* Curt.

NEUROPTERA. *Conwentzia psociformis, Coniopteryx tineiformis, Semidalis aleurodiformis* and var. *curtisiana*.

PSOCOPTERA. A number of species including *Psocus longicornis* F., *P. nebulosus* Steph., *Trichadotecnum 6-punctatus* L., *Amphigerontia bifasciata* Latr., *Reuterella helvimaculella* End., *Caecilius fuscopterus* Latr., *Philotarsus flaviceps* Steph., *Mesopsocus unipunctatus* Müll.

DIPTERA. By Mr. J. R. Dibb: A number of species from the New Forest, including various Tabanidae; *Haematopota italica* Meig.; *Bombylius major* L. and *B. 4-maculata*.

ODONATA. By Mr. T. D. Hincks: A case of various species from Sarawak.

LEPIDOPTERA. By Dr. Croft: A number of specimens of *Colias croceus* from the South of England and a case containing species taken in and around his house on the outskirts of Leeds.

The evening meeting was spent in hearing the reports from the various Committees in the Section and in the election of officers for the coming year. The general consensus of opinion was that the past season, notwithstanding the

settled fine weather, had been markedly unproductive, but that the promise for next year was more favourable, as greater numbers of larvae would have been enabled to mature.—E. G. BAYFORD, *Hon. Sec.*

ENTOMOLOGICAL SOCIETY OF LONDON: *Wednesday, October 17th,* 1928.—Mr. J. E. COLLIN, President, in the Chair.

Dr. J. Waterston exhibited a comb of the Hive bee formed on a hawthorn hedge during the temporary settling of a swarm, also a Queen wasp with a large parasitic worm which had issued from its abdomen. Mr. J. B. Pearman exhibited and made remarks on numerous specimens illustrating methods of oviposition in the Psocoptera. Colonel F. A. Labouchere exhibited varieties of *Melitaea cinxia.* Mr. F. W. Edwards exhibited a remarkable new Cecidomyiid fly from the Cameroons. Professor E. B. Poulton, F.R.S., exhibited and made remarks on :—(1) Dark-coloured parasitised pupae of *Pyrameis cardui* found on a black iron fence near St. Helens, Isle of Wight; (2) repeated attacks on a Euploeine butterfly by a captive bird; (3) the resting attitude of the Oriental butterfly *Kallima.*

Wednesday, November 7th, 1928.—Mr. J. E. COLLIN, President, in the Chair.

The President announced the deaths of Mr. J. Edwards and Mr. C. F. Johnson, Fellows of the Society.

Dr. J. L. Reverdin, of Geneva, was elected an Honorary Fellow of the Society.

The following were elected Fellows of the Society:—Mrs. M. E. Walsh, Soekaboemi. Java; A. H. Wood, King's College, Cambridge; Major H. C. Jeddere-Fisher, Woodlands Corner, Littlehampton, Sussex; M. Octave Piel, Zi-ka-wei, near Shanghai, China; A. G. B. Russell, 88A Cromwell Road, S.W.7; W. H. Potts, Tsetse Research Team, Kondoa, Tanganyika Territory; Commander Wyndham Forbes, D.S.O., R.N., Naval and Military Club, 94 Piccadilly, W.2; Dr. A. Dampf, Chief Government Entomologist, Avenida Insurgentes, 171 Mexico D.F., Mexico.

Dr. S. A. Neave read a communication from Captain J. C. Eales-White comprising correspondence from various sources recording the occurrence of *Colias edusa* in many parts of Southern England in 1928. Mr. K. G. Blair corrected a note by him in the Proceedings for the previous year, in which he had stated that he had failed to pair bred examples of *Pachygastria trifolii,* as he had since found that the eggs from the insects in question had hatched. Professor E. B. Poulton, F.R.S., discussed and exhibited specimens respecting the following:—(1) Of the migratory flight of the Nymphaline *Cymothoe caenis* Drury, in Uganda and the Belgian Congo; (2) Further notes by W. A. Lamborn on the 'Clothes Moth' *Tineola uterella* Wlsm., in Africa; (3) The larva and cocoon of the Elaterid beetle *Tetralobus flabellicornis,* from Uganda; (4) The Ichneumonid *Echthromorpha variegata* Brullé, a parasite of Lepidopterous larvae from Uganda; (5) The attacks of birds upon swarming bees in Uganda. Mr. O. W. Richards exhibited specimens and made remarks upon parallel colour variations in humble-bees from the Himalayas. Dr. J. Waterston, on behalf of Mr. G. E. Nixon, exhibited large workers of *Vespa germanica* approaching the queen in size.

Wednesday, November 21st, 1928.—Mr. R. W. LLOYD, Vice-President, in the Chair.

The Secretary announced that the Council had nominated the following as Officers and Council for 1929-30:—President, Dr. K. Jordan; Treasurer, W. G.

Sheldon, F.Z.S.; Secretaries, S. A. Neave, M.A., D.Sc., F.Z.S., and N D. Riley, F.Z.S.; Librarian, H. J. Turner; other Members of the Council—R. Adkin, E. C. Bedwell, J. E. Collin, F. W. Edwards, Captain A. F. Hemming, C.B.E., F.Z.S., R. W. Lloyd, R. Stewart MacDougall, M.A., D.Sc., F.R.S.E., G. A. K. Marshall, C.M.G., D.Sc., F.R.S., J. W. Munro, D.Sc., W. Rait Smith, W. H. T. Tams, A. E. Tonge.

The following were elected Fellows of the Society:—Professor C. Bolivar y Pieltain, Museo Nacional de Ciencias Naturales, Madrid, Spain; J. W. McHardy, B.Sc., Entomologist, Medical Laboratories, Dar-es-Salaam, Tanganyika Territory; H. S. Hanson, South Molton, N. Devon.

Mr. Alan Druitt exhibited examples of *Deilephila livornica* and *Sterrha sacraria* taken in Hampshire in September and October of this year. Mr. A. F. Griffith, a visitor, exhibited a number of British Lepidoptera, including varieties of *Melitaea aurinia* and *Chrysophanus phlaeas*. Dr. K. Jordan, a number of rare Sphingids and parasitic larvae of the South American fly *Dermatobia hominis*. Mr. C. de Worms, a variety of *Boarmia punctularia*. Professor E. B. Poulton, F.R.S., on behalf of Mr. H. L. Andrewes, communicated notes of migratory Pierines in Dorset during the past summer and on the apparent courtship of a female *Gonepteryx rhamni* by a male *Colias croceus*. Mr. R. J. Wilkinson exhibited a large number of cabinet drawers of Lepidoptera to illustrate his views on problems of mimicry.—S. A. Neave, *Hon. Sec.*

OBSERVATIONS AND RECORDS FOR SOME THYSANOPTERA FROM GREAT BRITAIN. IV. *AMBLYTHRIPS ERICAE* (HALIDAY).

BY GUY D. MORISON, PH.D., M.SC. (LOND.),
North of Scotland College of Agriculture, Aberdeen, N.B.

Amblythrips ericae (Haliday).

Priesner (Die Thysanopteren Europas, S.275-279) includes *Amblythrips* Bagn. in *Taeniothrips* Amyot et Serville. There is much in favour of this arrangement, but if *Amblythrips* be suppressed the reasons for suppression apply almost equally to the unsuppressed *Rhopalandrothrips* Priesner. Almost certainly the *Taeniothrips*-complex (*sens. lat.*) will undergo changes in nomenclature when more species are found and the immature stages are better known, so for the present I retain the name *Amblythrips*.

Both sexes of adults exhibit fair variation in size, and the extreme and intermediate sizes may be found on the same bush. From linear measurements of chitinous portions, which cannot be stretched, a large insect of either sex is seen to be about one-third longer than a small specimen. Measurements show that individual variability exists in the sizes of various sclerites. As usual, the most frequent deformities occur in the antennae of both sexes. I have found a few females, forma *pallens* Priesner, which I consider to be a form and colour characteristic of some young insects.

The conspicuous areas of delicate chitin on urosterna III-VIII of the male seem not to have been described previously. On each of urosterna III-VIII of the male there is an anterior transverse area, about 85-120 : 10-14μ, and caudad and parallel to the ends of each anterior area there lies a pair of elliptical or circular areas about 30 : 10 or about 14μ in diameter. The glandular areas over which these areas lie, are extra conspicuous in young insects.

As seen within the body of the female, the mature egg is elongated, somewhat reniform, equally rounded at both ends and measures about 240 : 95μ with a shell 2-3μ thick. Two or three eggs mature together. The small eggs in the ovarioles are not as easily seen through the body as in many other Thripids of similar colour and size.

Specimens were found commonly at Oxshott and Virginia Water, Surrey, Burnham Beeches, Bucks, Bagshot, Berks, Epping Forest, Essex, and in many localities in Aberdeenshire and Kincardineshire, and near Belfast in N. Ireland. Judging from the finding of immature and adult insects, the host plants are *Calluna vulgaris, Erica cinerea, E. Tetralix,* but numerous females with few males often occur on many other plants, usually growing near ling or heather. Though adult insects will frequent various species of plants during other months of the year, they seem most inclined to wander shortly before their true host-plants start flowering. I have found them on : *Juniperus communis, Orchis latifolia, O. maculata, Agropyrum repens, Myosotis palustris, Pedicularis palustris, P. sylvatica, Epilobium angustifolium, Vicia Cracca, Ulex europaeus, Genista anglica* and *Cochlearia officinalis.* They sometimes occur on plants sprayed by the sea.

In N.E. Scotland during the years 1924-28 females were found March—October, males May—October, nymphs I July—September, nymphs II July—May, prepupae and pupae May and August. In S. England females, males and nymphs were found during the same months, but prepupae and pupae were found in September.

Males are most numerous during June—July in N.E. Scotland, but females are usually much commoner than males. Often during summer hundreds of adults and nymphs may be found in a few minutes on a small patch of *Calluna* or *Erica*, but the plants show no signs of damage. Generally it is uncommon to find dead Thysanoptera in the field, but the flowers of *Erica* during autumn often shelter numbers of dead females of *Amblythrips*, which are dislodged when the plant is beaten vigorously. Once an immature stage of a mite was found attached to a nymph II.

In N.E. Scotland females begin to appear on *Calluna* and *Erica* in March. These individuals are very dark, and probably they became adults during the previous autumn. Probably they do not start laying eggs till the end of June. Meanwhile during April-June their numbers are augmented by similar females presumably emerging from hibernation. From the middle of May to the middle of June, both sexes of nymphs II which have passed the winter on *Calluna* and *Erica*, rapidly complete their metamorphosis on the plants. These numerous young insects and the few older ones will give rise to the multitudes of nymphs found in August and September. There is an overlapping of the instars of nymphs from July to September. Some of the first nymphs complete their metamorphosis on the plant, or, more commonly, in the earth. The resulting adults swell the August throng, and in S. England they may have time for a second generation maturing the same year. Probably the late emerging females survive till the next year. The nymphs II which pass the winter are probably the last of the season to emerge from the eggs. During October they occur very commonly in various sizes on *Calluna*. They are broader and darker insects than the summer nymphs, and they seem less active, though this may be a question of the association of activity with temperature. Certainly hard frost reduces their activity. During winter they are found most abundantly on those plants which flowered the best during the previous season.

Both sexes occur amongst the over-wintering nymphs II. The males are usually scarcer than females, but the most interesting fact is that their sex is distinguished easily, in mounted specimens, since they are usually smaller and paler than females, and in each the testes-rudiments appear as a pair of internal, dark, orange-coloured, spherical bodies towards the end of the abdomen. I have not seen sexual distinctions amongst the summer nymphs.

Having passed the winter, both sexes of nymphs complete their metamorphosis on the plant from the middle of May to the middle of June, but I do not know the time taken by an individual insect during its various stadia. The prepupa and pupa of either sex shows an amount of activity comparable with that shown by some others of the *Taeniothrips-Thrips*-complexes. Since the prepupa and pupa of both sexes are unknown to science, I proceed to describe them and to figure those of the female. Very little has been written of these instars of closely allied Thripids, but I believe that the female prepupa and pupa will be recognised by the comparative sizes of head and pronotum, the male by the lack of wings and by the deails of chaetotaxy.—

♀ ***Prepupa*** (text.-fig. 1). General body colour bright orange yellow. Antennae, legs and wings very pale yellow. Eyes almost black with more or less crimson pigment towards the inner margins. Hairs colourless or very pale greyish yellow, but the four dorsal, upturned processes of abdominal segment IX are brownish yellow towards their apices.

Measurements in μ: Length : width. Head 72 : 130; eyes 30 : 20; mouth-cone 90 : 120, width at base; antenna 156 : 40, width across second segment; pronotum 132 : 138 : 216, widths at anterior and at posterior; pterothorax 190-210 : 260; forewing 310 : 50, width at middle; hind-wing 250 : 36, width at middle; abdomen 600-700 : 310-330; each of 4 dorsal processes of abdominal segment IX 20 : 12, width at base; total length of insect 1000-1100. Length of hairs: interocular 43-50; postocular 34-46; longest hairs of pronotum 60-75, of fore-wing 58-72, of tibiae I, II, III, 30. 30, 35 respectively, on abdominal segments II-VIII, 90-100, longest on IX, 80-90.

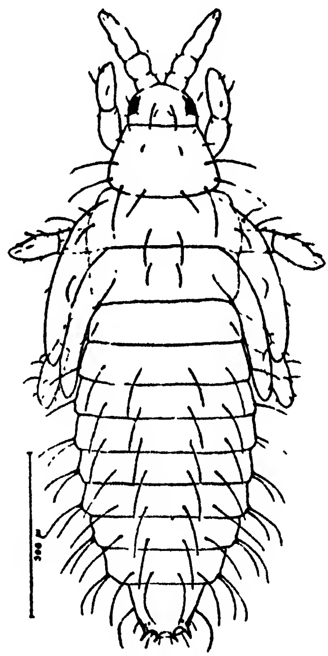


Fig. 1. *Amblythrips ericae* (Hal.). Female prepupa.

The dorsal morphology and chaetotaxy are as depicted (text—fig. 1). The ventral chaetotaxy consists of three pairs of short delicate hairs on the head and mouth-cone respectively, a pair of long delicate hairs on pro-, meso-, and meta-thorax, few short delicate hairs on the basal segments of the legs, three pairs of long delicate hairs on abdominal segments III-VIII, and three short pairs on IX. The small X segment bears a pair of fairly long hairs and anoter pair about half as long. It ends bluntly. The XI segment is a minute area which is most conspicuous on either side of the termination of the gut. For the developing ovipositor the

posterior ventral margin of VIII is produced backwards in a pair of sheaths apposed to one another in the mid-ventral line and ending just before the middle of IX. A similar pair of sheaths arises near the middle of IX before the end of those of VIII and projects a little caudad to them.

♀ *Pupa* (text-fig. 2). Depending on its age the pupa varies in colour from that of the prepupa to that of the young adult female. The pupal cuticle is colourless with four dorsal processes of abdominal segment IX and the hairs coloured like that of the prepupa.

Measured like prepupa: Head 90 : 156; eyes 60 : 32; mouth-cone 90 : 150; pronotum 130 : 162 : 234; pterothorax 162-186 : 282; fore-wing 500-522 : 60; hind-wing 408-450 : 38; abdomen 570-720 : 300-320; each of 4 dorsal processes on abdominal segment IX 30 : 12; total length of insect 910-1100. Length of hairs: interocular 75; postocular 72; longest hairs of pronotum 95-116, of fore-wing 100-116, on tibiae I, II, III, 80, 50-75, 70-87, on abdominal segments II-VIII 120-145, on IX 90-100.

The dorsal morphology and chaetotaxy are as depicted (text—fig. 2). The antennae are turned upwards and backwards, reaching almost to the middle of the pronotum. One pupa has a single long hair at one of the anterior angles of the pronotum. The ventral chaetotaxy is like that of the prepupa except that the hairs are longer. The sheaths on the ventral surface of abdominal segment VIII become blade-like and terminate at the posterior margin of IX, whilst those of IX are also elongated and end just above them. The X segment is prolonged in a short conical process, and XI is very small.

♂ *Prepupa.* Coloured like ♀ prepupa.

Measured like ♀ prepupa: Head 72 : 102; eyes 24 : 12; mouth-cone 80 : 100; antenna 132-144 : 36-40; pronotum 120 : 108-120 : 174-186; pterothorax 168-180 : 228; abdomen 528-560 : 270-288; testis rudiment, about 50 : 45; each of four dorsal processes on abdominal segment IX, 18 : 6; total length of insect 640-900. Length of hairs: interocular 23-30; postocular 12-15; longest hairs of pronotum 30-58, of tibiae I, II, III, 14, 10, 10, on abdominal segments II-VIII 35-72, on IX 58.

The ♂ prepupa is like the ♀ prepupa, but smaller, wingless, without sheaths on the ventral surface of abdominal segments VIII and IX, and with testes-rudiments conspicuous within the abdomen. The chaetotaxy is the same except that meso- and meta-thorax bear each four pairs of short hairs towards the sides dorsally.

♂ *Pupa.* Depending on its age the pupa varies in colour from that of the prepupa to that of the young adult male. The pupal cuticle is colourless with four dorsal processes of abdominal segment IX and the hairs coloured like those of the prepupa.

Measured like ♀ prepupa: Head 72-90 : 108-120; eyes 42 : 20; mouth-cone 84-96 : 104-120; pronotum 120-138 : 120-132 : 186-210; pterothorax 140-198 : 222-246; abdomen 510-678 : 240-288; testis rudiment about 48 : 45; each of 4 dorsal processes on abdominal segment IX, 23 : 8; total length of insect 840-990. Length

of hairs: interocular 43-50; postocular 20-38; longest hairs of pronotum 30-63, of tibiae I, II, III, 20-29, 14-20, 14-32, on abdominal segments II-VIII 63-95, on IX 60-65.

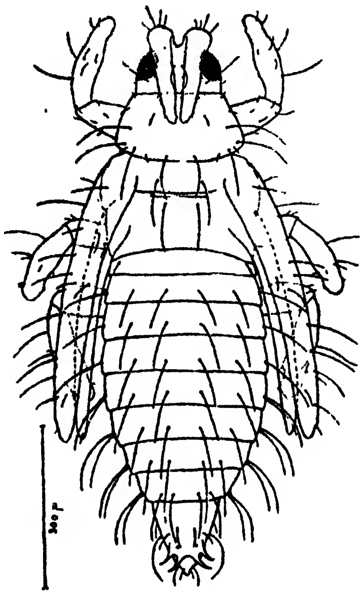


Fig. 2. *Amblythrips ericae* (Hal.). Female pupa.

The ♂ pupa is like the ♀ pupa, but smaller, wingless, without sheaths on the ventral surface of abdominal segments VIII and IX, with the testes rudiments conspicuous within the abdomen, and with abdominal segment X produced backwards into a very short (8μ long) conical process. The chaetotaxy is the same except that the mesothorax bears dorsally two pairs of long and 3 pairs of shorter hairs, and the metathorax one pair of long and one pair of short hairs.

The prepupal and pupal cuticle is quite smooth and colourless. The prepupal cuticle forms four very imperfect facets over the eyes, but over a dozen better defined facets appear in the pupal cuticle. The maxillary and labial palps of prepupa and pupa are small, blunt, unsegmented prominences. As in the nymphs, the prepupal and pupal spiracles lie on the mesothorax and abdominal segments II and VIII. Variability in length of hairs for individual insects is most marked in ♂ pupae. Four orange-coloured Malpighian tubes are conspicuous in prepupa and pupa, and in adult males. They are usually conspicuous in overwintering nymphs, but I have not seen them in nymphs of the summer generation. The degree of opacity of females determines whether the tubes can be seen in them.

All the prepupae and pupae were described from specimens found on *Calluna* and *Erica* in Kincardineshire. The ♀ prepupa was described from 10 specimens, the ♀ pupa from 4 specimens, the ♂ prepupa from 10 specimens, the ♂ pupa from 15 specimens. I have deposited in the British Museum (Natural History) a type slide with 4 specimens of the ♀ prepupa, a holotype and one paratype of the ♀ pupa, a type slide with 4 specimens of the ♂ prepupa and a type slide with 3 specimens of the ♂ pupa.

Entomological Department,
Marischal College, Aberdeen, N.B.
October 22nd, 1928.

A NEW SPECIES OF *BLEDIUS* MANNH.

BY B. S. WILLIAMS.

Bledius (*Blediodes* M. & R.) *praetermissus* sp. n.

Head black, dull, plainly and roughly shagreened, moderately closely but feebly punctured at the sides, centre of the vertex impunctate; apex of antennal prominences and a transverse line connecting these smooth and shining; *eyes* prominent; *mandibles* dark-reddish testaceous, black at base; *maxillary palpi* testaceous, with the penultimate joint infuscate. *Antennae* long and slender, from the 6th joint widened and gradually clavate, infuscate with the first three or four joints yellow, 1st joint long, occupying ¼ the total length; 2nd elongate, ⅓ the length of the 1st. 3rd much shorter than 2nd, 4th as long as broad, 5th transverse, 6th–8th strongly transverse, almost twice as broad as long, 9th and 10th transverse, about 1⅓ times as broad as long, 11th twice as long as 10th. *Thorax* moderately shining, dark pitchy red to dark pitchy brown, moderately transverse, as wide at apex as elytra at shoulders, rather dull, finely and plainly reticulate, with a distinct median impressed line or channel, shallowly and diffusely punctured, each puncture bearing a long, thin, semi-recumbent and inwardly directed pale hair, sides and base narrowly margined, sides subparallel to the posterior third, from whence they are narrowed to the base, posterior angles rounded and obliterated. *Elytra* moderately shining, almost as broad as long, 1⅓ times as long as thorax. slightly widened posteriorly, testaceous with the fine sutural margins black, the scutellary and sutural regions duskily clouded, puncturation close, deep and somewhat rugose. very much closer and deeper than that of thorax, pubescence pale, regular, noticeably shorter than that of any other part of the upper surface. *Hind body* gradually widely from the base to the 5th free segment, pitchy red to black, with extreme apex and apical margins of the 5th and 6th free segments testaceous, moderately shining, the whole upper surface finely but plainly reticulate, scantily pubescent, the tergites bearing small asperities which are most numerous on the 1st, the 5th being almost smooth, the 3rd to 5th free tergites generally show traces of a few feeble punctures. *Legs*, including coxae, clear yellow. *Length*, 4 mm.

Type in the National Collection at the British Museum.

Whilst on holiday in the Isle of Wight last June I found this species in damp spots at the base of the cliffs at Sandown and Luccombe, where it occurs in scattered colonies. Though examples

were numerous, unfortunately I did not take a great number as at the time I believed it to be *atricapillus* Germ. However, when the Isle of Wight specimens were compared with a series of *atricapillus* from Pegwell Bay, their specific distinctions became apparent. Colonel Deville has kindly examined a specimen for me and in his reply stated: 'I knew a long time ago this *Bledius*. It was hitherto considered as a large and maritime form of *atricapillus*. I have captured it, 1911 at Wimereux, 1919 at the Cap Gris-Nez, 1927 (plentiful) at Cap d'Alprecht near Le Portel, all localities near Boulogne. It lives exclusively in the beds of muddy sand of the cliffs. The last year, since I had examined it more accurately, I recognised it as a valuable species. It is, too, the opinion of Dr. Bernhauer, to whom I communicated specimens.'

Col. Deville most generously accompanied his letter with a series of this species from Cap d'Alprecht, which agree in all respects with British examples. In addition to these specimens, I am indebted to my friend Mr. P. Harwood for the loan of his series of 38 specimens standing in his collection under the name of *atricapillus*: of these only three are *atricapillus* (Chatham), the remainder being *praetermissus* from the following localities: Ventnor, Isle of Wight; Blackgang Chine, Isle of Wight; Milford, Charmouth, and Carton.

B. praetermissus closely resembles *B. atricapillus*, but may be separated by its stouter build, average larger size, darker colour of thorax and hind body, the infuscate penultimate joint of the maxillary palpi, darker antennae, duller appearance, and especially by the obviously stronger and closer puncturation of the elytra and the distinct reticulation of the upper surface of the hind body, the reticulation in *atricapillus* being obsolete, thereby giving the hind-body of this species a more shining appearance. Neither *B. atricapillus* nor *B. praetermissus* exhibit any secondary sexual characters, the formation of the tergite and sternite of the 6th free segment of the hind body being similar in both sexes in both species. The aedeagi show certain differences. *B. praetermissus* is also allied to *B. opacus* Block., but this species is readily separated by its more transverse thorax and red elytra.

Col. Deville, owing to the exigencies of his very busy life, has been unable to find time to describe the species, and has asked me to do so. I have to thank him for his valuable assistance.

15 Kingcroft Road, Harpenden.
December 31st, 1928.

ATOMARIA MORIO KOLENATI, A SPECIES OF COLEOPTERA NEW TO BRITAIN.

BY HORACE DONISTHORPE, F.Z.S., F.E.S., ETC.

Broad, oval, convex, head and thorax dark ruby red, elytra shining black, mouth-parts, antennae and legs reddish testaceous, antennae slightly darker, clothed with very sparse and fine yellowish down. *Head* considerably narrower than thorax, even at the apex of the latter, straight or almost straight behind the eyes, finely and not very closely punctured; eyes black, prominent, pointed behind, facets fairly coarse; antennae unicolorous, fairly long, reaching base of thorax, with well-marked three-jointed club; first joint of antennae broader than second, second joint a little shorter and narrower than the first. but broader and longer than the following six, three to five elongate, six to eight rounded, the seventh a little broader than sixth and eighth, all three joints of the club considerably broader than the rest of the antennae, the two first transverse, the last joint nearly as broad as the two preceding ones, but about as long as broad, rounded with a blunt point at apex.

Thorax broadest just before base, strongly contracted in front, anterior angles prominent, sides rounded, slightly contracted to base, posterior angles right angles, side borders narrow, scarcely visible at apex, base straight and distinctly bordered, with a broad shallow transverse depression, not very closely and a little more strongly punctured than head, smooth between the punctures. with larger, more widely-separated punctures within the basal impression.

Elytra long-oval, convex, broader than thorax even at base, broadest before middle, contracted to apex, which is somewhat acuminate, with fairly close punctures arranged in rows, about the size of the punctures on disc of thorax, a little coarser near suture below the scutellum, finely alutaceous between the punctures; scutellum transverse, rounded at base, finely and not closely punctured. Legs fairly long and slender. *Underside* pitchy, abdomen red, distinctly and not closely, abdomen more finely, punctured.

Length 2 mm.

This very distinct and handsome species comes in the subgenus *Anchicera,* which differs from *Atomaria* s. str. in having the antennae not so close together at the base, the body being more oval and convex, and not so parallel-sided. It does not possess a basal fold on each side of the transverse impression on the thorax. It can hardly be mistaken for any other species in the British. I captured several specimens in an old jackdaw's nest in a fallen beech tree in Windsor Forest on November 22nd, 1928.

Having failed to name the insect, I drew up the above careful description, and sent specimens to Mr. Collins of Oxford, and Colonel Deville, both of whom were unable to name it. The latter suggested that I should send it to Dr. K. Holdhaus of Vienna. This I have done, and he states that it is a somewhat aberrant example of the above species, and that there are specimens of the same colour as mine in the Vienna Museum from Norway and Mähren. Ganglbauer describes it as dark chestnut-brown or entirely brown-red, and Reitter as red-brown to black, head and thorax generally lighter brown. As stated above, my specimens have shining black elytra and dark red head and thorax. Other-

wise it agrees fairly well with the description as quoted by Ganglbauer. Reitter gives 'Prussia, very rare'; and Ganglbauer 'Sweden, Germany, Austria, Caucasus, very rare.'

19 Hazlewell Road, Putney, S.W.15.

January 12th, 1929.

NOTES ON BRITISH SPECIES OF *AMAURONEMATUS* (TENTHREDINIDAE), WITH SPECIAL REFERENCE TO CAMERON'S DETERMINATIONS AND TO THE OCCURRENCE OF SEVERAL SPECIES NOT CONTAINED IN OUR LISTS.*

BY R. C. L. PERKINS, D.SC., F.R.S.

Cameron, is his monograph of the British sawflies, described seven forms which can with certainty be referred to *Amauronematus*, and he figured the saw of each. It is doubtful whether in some cases all the specimens that he referred to a species really belonged to one, or whether his actual descriptions were drawn up from the individuals from which he dissected the saws; but, presuming this to be the case, the figures of the saws give a more certain identification of some of his species than the descriptions.

The species recognised by Cameron were *histrio, glenelgensis, longiserra, haemorrhoidalis, humeralis, imperfectus* and *canaliculatus*. According to the ideas of later workers, almost all of Cameron's species were referred wrongly to those named above. The two first named are certainly one species, the well-known *histrio* Lep., and *longiserra* is certainly *viduatus* Zett., the saw being unique, a good deal like a *Pontania*, and as different as possible from that of true *longiserra*.

So far as I know, only two species of *Amauronematus* have the sides of the saw traversed by bands of pointed (microscopic) unequal spine-like processes, viz., *histrio* and the allied *fallax*, but Cameron figures four such species, his *humeralis* and *canaliculatus* both having the saws thus armed, as well as the two first of his species (*histrio* and its var.). His general descriptions of *canaliculatus* and *humeralis* do not differ notably from known varieties of *fallax*, and the first-named can, I think, only be referred to this. His *humeralis* with regard to the spinose bands on the saw appears abnormal as compared with the *fallax* I have examined, but on the whole is best referred to this, when we consider that his figures of the saws of *histrio* and *glenelgensis* show considerable apparent differences, though, no doubt, they belong to a single species. *A. humeralis* as determined by Konow and Enslin has a totally different saw, while *canaliculatus* Hart. is considered to be *A. puniceus* Chr., which also has a totally different saw from Cameron's species of that name.

* Most of these species have been recorded by me from time to time in the Proc. Torquay Na Hist. Soc., not strictly an Entomological or Zoological publication.

The species he calls *imperfectus* is well known to me and has a very distinct saw, and I cannot assign it to any described species, though possibly it may be one of the supposed (named) varieties of *vittatus* of Enslin's' work. The larva, like most *Amauronematus*, feeds on sallow, but that of *imperfectus* Zadd. feeds on larch and is considered to be a *Pachynematus*, while its saw is as remarkable as that of Cameron's species, but as different as possible from this. *A. haemorrhoidalis* Cam.—he gives *vittatus* Lep. as a synonym—is *vittatus* according to the saw of a specimen so named by Konow, which I have compared with Cameron's figure. It should be noted that the *Nematus haemorrhoidalis* of Hartig is considered to be the same as *Pachynematus xanthocarpus* of the same author.

Morice in his 'Help Notes' tabulates nine species—he leaves out Cameron's *canaliculatus*—of which he had seen British specimens, all of which he had sent to Konow and had named by him. Of these, two species appear to be very doubtfully valid, viz., *A. moricei* and *A. leucolenus*. The former, so far as the ♀ is concerned, appears to be *Pteronidea ferruginea*—Chitty's specimen was caught in Scotland—and the ♂, which has the appearance of a specimen extracted dead from a cocoon, was obtained by the same collector in Kent. I do not know on what ground Konow considered these specimens to belong to one species. *A. leucolenus* is so similar to *viduatus* that until the saw is examined it is best considered as a variety. Leaving these out of consideration, I have been able through the kindness of Prof. Poulton to examine the saws of all the other species tabulated in 'Help Notes,' the slides prepared by Morice from specimens (not necessarily British) named by Konow. I have also examined a number of slides prepared from our own material. Of the species tabulated by Morice I do not know *mundus*, but I have examined his slides of the saws of this and of *longiserra* from insects named by Konow, and these are very distinct from one another, though the insects are considered varieties of one species by Enslin. *A. longiserra* has not, so far as I know, occurred in Britain, but its saw has a great similarity to that of *imperfectus* Cameron, though otherwise there is no resemblance between the species and they are obviously very distinct.

In the years following the publication of his 'Help Notes' other species became known to Morice as British, and these would have been included in the Revision of this work, which he had in hand at the time of his death.

So far as I can judge, the following is a complete list of the British species of the genus at the present time. Species marked * have apparently not been recorded as British, except in local publications (e.g. Proc. Torquay N.H. Soc.), and are therefore possibly not in the lists of most students of the group. I have marked with a † such species as have been bred by myself.

1. †*A. histrio* Lep. (var. *glenelgensis* Cam.).
2. *A. fallax* Lep. (=*canaliculatus* Cam. ?=*humeralis* Cam.).
3. *A. mundus* Kon.
4. †*A. viduatus* Zett. (?var. *leucolenus* Kon., =*longiserra* Cam).
5. *†*A. sagmarius* Kon.?
6. *†*A. miltonotus* Zadd.
7. *†*A. tunicatus* Zadd.
8. *†*A. fahraei* Th.
9. †*A. puniceus* Chr.
10. †*A. vittatus* Lep. (=*haemorrhoidalis* Cam.)
11. †*A. cameroni* n.n. (=*imperfectus* Cam.).
12. †*A. humeralis* Lep
13. **A. taeniatus* Lep.
14. †*A. amplus* Kon.

Eleven of the fourteen species have been found by me in Devon, and specimens of all these have been bred.

With regard to the species I have referred with doubt to *sagmarius* Kon., it varies considerably in more or less important characters, but some individuals of the ♀ closely approach the description given by Enslin. The ♂, however, is apparently quite different from that attributed to *sagmarius* by him, so that, if he is correct, ours is probably an undescribed species, for there is no doubt of the sexes in our species, since these have been bred together. The species I have called *cameroni* was considered by Morice to be *vittatus*, when I sent him specimens, and apparently the ♂ at least of the *vittatus* of his 'Help Notes' was my species.

Some of the Devon *humeralis* cannot be determined as such from Enslin's tabulation. They have the mesopleura entirely white or practically so, and the mesonotum and even the scutellum may have considerable whitish markings. But, with these, dark or normal examples occur, and the saw agrees entirely with that of a specimen in the Morice collection, named, I believe, by Konow.

For a specimen of *A. taeniatus* Lep. I am very much indebted to Mr. J. W. Saunt, who captured it in April, 1923. I have also seen a saw on a slide in Morice's collection marked '*taeniatus* ? Stenton.' Saunt's specimen had been determined incorrectly by Morice as *humeralis*.

Newton Abbot.
December 20th, 1928.

THE EGGS OF SOME HEMIPTERA—HETEROPTERA.

BY W. STEER, B.A. (CANTAB.), F.E.S.

Although there are many records of the oviposition in living plant tissue of various species of Hemiptera-Heteroptera, there seem to be few records of eggs being laid in dead tissue or wood (*e.g.* fence posts). In view of this the following notes may be of some interest.

**Calocoris norvegicus* Gmel. (*bipunctatus* F.).

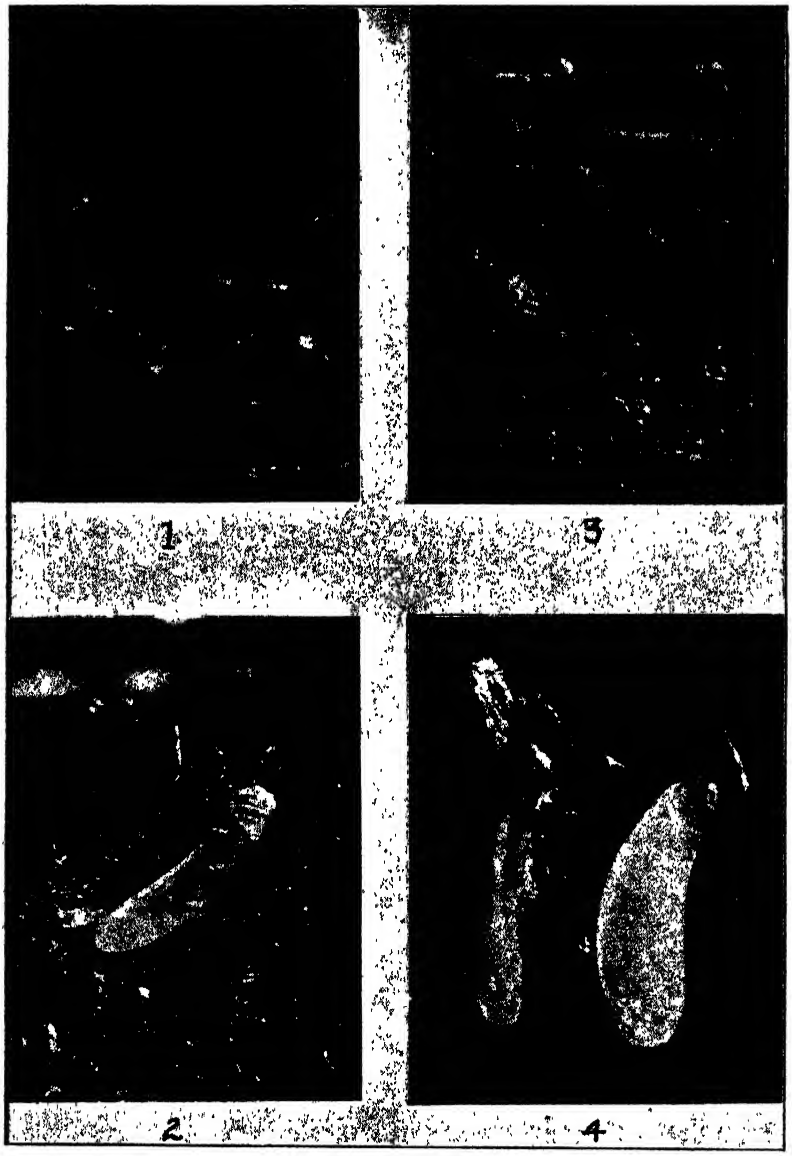
On the evening of August 1, 1928, Mr. Massee (of the East Malling Research Station) drew my attention to large numbers of the Capsid *Calocoris norvegicus* Gmel., busy ovipositing in some chestnut posts and 'spiles' used as supports for a wire netting fence. The method of oviposition was observed and noted by us at the time (6, 7), and is briefly as follows :—

Having drilled a hole with the rostrum, the insect unsheathes its ovipositor, and, holding it at right angles to the body, inserts the tip in the hole. Then, taking a firm hold with all six legs, and rocking the abdomen, it works the ovipositor in a downward and backward direction until it is deeply buried. The egg is then laid and the ovipositor withdrawn. Butler (1) quotes Osborn's description of similar procedure adopted by *Leptopterna dolobrata* L. when ovipositing in plant stems, and Knight (5) describes certain American species as laying eggs in captivity in a similar manner beneath the bark of apple and pear branches. On several occasions during September, 1928, the common green Capsid, *Lygus pabulinus* L., was observed by the writer ovipositing in stems of the black currant (*Ribes nigrum*), and the method of oviposition of this species also appeared to be much the same. The *Lygus,* however, appears merely to pierce the rind of the shoot with the rostrum, whereas the *Calocoris* inserts the mandibular and maxillary stylets into the wood to their full extent.

Calocoris eggs dissected from chestnut posts are always flattened laterally. Probably they are compressed in passing down the ovipositor, and the shape thus acquired maintained by lateral pressure of the wood, since newly-laid eggs, on being removed from the wood, tend to regain their original tubular shape.

The eggs examined were all laid parallel with the grain of the wood, sometimes singly, often in clusters, the cap being buried to

* The names *norvegicus* and *bipunctatus* are used almost indiscriminately for this Capsid by British writers The species was originally described by Fabricius in 1781 as *Cimex bipunctatus.* This was a *nom. praeocc.*, however, having been used for another species by Linné in Syst. Nat. 10th edn., 1758, I, 444 (see Reuter, Rev. Syn. Het. Pal., 1888, p. 390). Gmelin, in Linné Syst. Nat. 13th 788. Tome I, pars iv, 2176, reproduced Fabricius' description under the name *Cimex norvegicus.* he specific name *norvegicus,* therefore, has priority.



OVA OF HEMIPTERA-HETEROPTERA.

Photo. W. Steer.]

a depth of about .2 mm., and the rounded end directed either upward or downward. The concave edge always lay nearest the surface of the wood.

Description of Egg (Pl. II, fig. 1).

Length 1.42 mm.

Whitish to yellowish, later turning yellow, with the cap white. Slightly curved, with apex rather bluntly rounded. When dissected from the wood in which it is laid, the egg is considerably compressed and narrowly elliptical in transverse section; taken from the body of a gravid ♀, it is cylindrical or subcylindrical, as described by Butler (2).

Cap white, shallow (.08 mm.), much compressed and furnished with fine longitudinal ridges or striae which tend to impart a crenulated effect to the margin, which is rounded.

Pieces of wood from the same fence were examined on November 22, and, in the softer parts of the wood especially, large numbers of *norvegicus* eggs were found, together with certain other eggs which cannot yet be referred to particular species. The *norvegicus* eggs had mostly swollen considerably, and, where the rottenness of the wood permitted, had regained the tubular shape possessed by Capsid eggs when in the body of the ♀. Those which had swollen were now white to pale cream in colour and contained embryos in the course of formation.

Calocoris fulvomaculatus De Geer.

The 'Shy Bug' or 'Needle-nosed Hop-Bug,' *C. fulvomaculatus*, is a serious pest of hops in some localities, but, curiously enough, is only prevalent in those hop-gardens where the old pole work is still used. The pest seems to have been spread about and introduced into fresh localities by the transportation of hop-poles from old to new sites. Theobald (8) states 'the females lay their eggs in the bine and in crevices of and under the bark on hop-poles.'

Portions of hop-poles from a hop-garden near Maidstone were examined on September 29 and on subsequent dates. In this garden *Calocoris fulvomaculatus* is reported to be prevalent every year. Capsid eggs were found in some numbers, imbedded in the wood in a similar manner to those of *C. bipunctatus*, which they much resemble. Generally they were found in the softer parts, but some were present in comparatively hard wood. There were also large accumulations of empty egg-shells, suggesting that oviposition in these poles was of annual occurrence. These eggs were compared with eggs taken from the body of a ♀ *Calocoris fulvomaculatus* and found to agree very closely with them. Those from the body of the ♀ were slightly smaller, which may be accounted for by the fact that they were dried up (the Capsid having been dead for about a month), and may not have been fully developed.

Professor Theobold tells me that in the hop-garden in question three species of Capsidae are prevalent, *Calocoris fulvomaculatus, C. norvegicus,* and *Orthotylus flavosparsus.* Some eggs of *norvegicus* were found, and also large numbers of smaller eggs of the Capsid type which might easily be those of an *Orthotylus. Orthotylus flavinervis** has on one occasion been observed by the writer ovipositing in an old chestnut post (August 1, 1928), and it is possible that other species oviposit in like manner.

The egg described below is almost certainly that of *C. fulvomaculatus.* The most distinctive character is the depth of the cap, in which it differs from the egg of *norvegicus* and agrees in every respect with the ovarian egg of *fulvomaculatus.*

Description of Egg (Pl. II, fig. 2).

Rather shorter and slenderer than egg of *norvegicus.*

Length, 1.38 mm.*

Whitish to pale yellowish, curved, compressed

Cap deep (.12 mm.*), much compressed laterally, with fine longitudinal striations and rounded margin, and, as with *norvegicus,* rising slightly higher at the convex than at the concave margin.

The neck of the cap is considerably constricted laterally, and the egg is gradually contracted towards it (not suddenly, as with *norvegicus*).

Nabis apterus F.

During the examination of hop-poles in the above-mentioned garden during September, 1928, for the eggs of *Calocoris fulvomaculatus,* large numbers of an unknown egg were found. These were laid in both ash and chestnut poles with only the caps showing (Pl. II, fig. 3). The latter were rather irregular in outline, but usually more or less pear-shaped and fitted with a sort of membraneous lid. When the lid was absent the cap could be seen to be depressed in the centre, only the rim being flush with the surface of the wood.

When dissected from the poles the eggs were found to be of the typical *Nabis* shape (Pl. II, fig. 4, and text figure 1B), and were suspected to be the eggs of *Nabis apterus,* a species common in hop-gardens, where is appears to feed on various insects such as the Aphid *Phorodon humuli.*

A few days previously a *N. apterus* brachypterous ♀, with the abdomen swollen and obviously pregnant, had been taken at East Malling and enclosed in a glass vessel in the hope of obtaining eggs. When examined on September 29, two eggs were found to have been laid at the bottom of the vessel. The following description applies to these two eggs.

* Kindly determined by Mr. W. E. China.
* Measurements based on examination of a few only, but in which no variation was noted.

Eggs of *Nabis apterus* F. (text fig. 1A).

Total length (laid in captivity), 2.3 mm. Greatest width, .6 mm.

Yellowish, smooth and shining, tubular, slightly curved. Widest about and just below the middle; narrowed towards neck and tapering slightly towards apex, which is rounded.

The cap is very distinctive and consists of a laterally constricted neck (*a*), and a deep collar (*b*), with an outwardly directed rim (*c*), and fitted with a sort of loose lid (*d*). The lid is of papery texture, finely sculptured and easily prised off. The neck is largely brown, deeply constricted at the sides, but less conspicuously so at the convex and concave margins of the egg. The collar is whitish (especially the rim and a transverse line immediately above the neck) and finely striate. The interior of the collar is mainly occupied ly a basin-shaped depression.

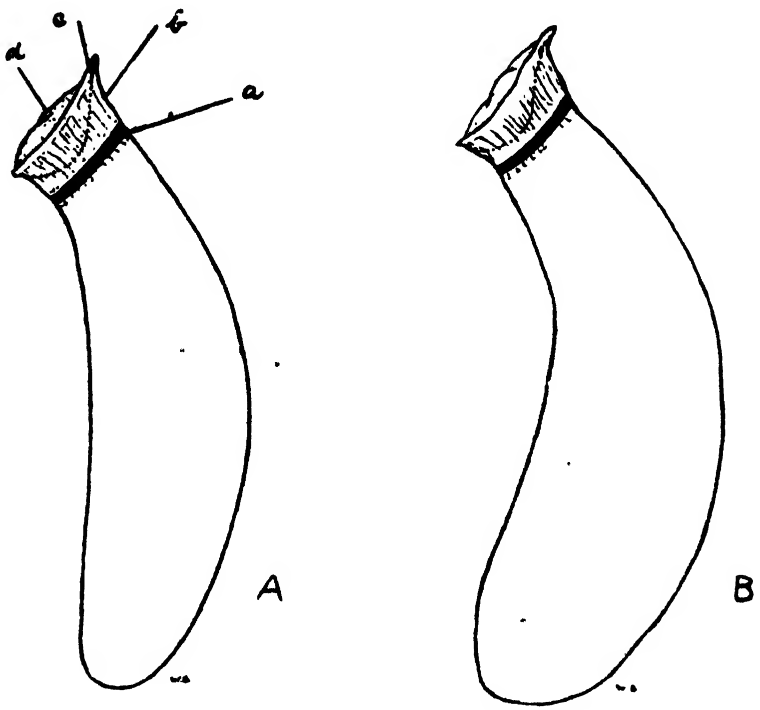


Fig. 1. (A) Egg of *Nabis apterus* F. laid in captivity. Right side. x 33. (*a*) neck; (*b*) collar; (*c*) rim; (*d*) lid.
(B) (? of *N. apterus*) dissected from hop-pole. Right side. x 33.

The measurements of the cap are as follows:—

Depth of collar from rim to neck, .3 mm on convex and .2 mm on concave side; diameter at rim, .52 mm.; width of neck, .4 mm.

The rim of the collar is seen in surface view to be rounded posteriorly and drawn out to a point anteriorly, and thus more or less pyriform in shape.

These eggs were compared with eggs dissected from the hop-poles (text fig. 1B), and a slight difference in length was apparent, the eggs laid in the poles ranging from 2.4 mm. to just over

2.5 mm. in length. The latter were also very variable in shape, the body of the egg often being considerably compressed by lateral pressure of the wood in which it had been laid. There was no essential difference in the shape or measurements of the caps.

The captive *Nabis apterus* was then supplied with a small piece of chestnut wood, and was given a supply of aphids upon which to feed. In the course of a day or two another egg appeared, laid in the wood with part of the cap projecting. This egg resembled those previously laid but was rather longer (2.4 mm.), and not much smaller than those found in the poles.

Chapman (4) and Butler (3) both record finding *Nabis* eggs (? *lativentris*) imbedded in a similar manner in stems of *Chlora perfoliata*.

It seems a reasonable assumption to regard the eggs found in hop-poles as the eggs of *Nabis apterus*, since they agree so closely with eggs of that species laid in captivity. Moreover *N. apterus* is found commonly in hop-gardens. It will be possible, however, to throw more light on the matter when the eggs hatch.

References.

1. Butler, E. A. (1923). A Biology of the British Hemiptera-Heteroptera, p. 371.
2. ——— *Ibid.*, p. 396.
3. ——— *Ibid.*, p. 271.
4. Chapman, T. A. (1906). The Eggs of *Nabis* (*lativentris*?), Entomologist, XXXIX, No. 515, pp. 73-74.
5. Knight, H. H. (1915). Observations on the Oviposition of certain Capsids. Journ. Econ. Ent., VIII, pp. 293-298.
6. Massee, A. M., and Steer, W. (1928). The Oviposition of *Calocoris bipunctatus* F. Ent. Mo. Mag., LXIV, pp. 207-208.
7. ——— ——— (1928). Capsid Bugs. The Gardener's Chronicle, LXXXIV, Aug. 25, p. 154
8. Theobald, F. V. (1925). The Needle-Nosed Hop Bug. Ministry of Agriculture Misc. Pubn. 42, 'Cultivation, Diseases and Insect Pests of the Hop Crop,' p. 66.

Explanation of Plate II.

Fig. 1. Chestnut pole split open to show egg of *Calocoris norvegicus* in situ, x about 21.

Fig. 2 Hop pole split to show egg of *Calocoris fulvomaculatus* in situ, x about 21.

Fig. 3. Surface view of a hop pole showing caps of four *Nabis* eggs, x about 15.

Fig. 4. *Nabis* eggs dissected from hop pole, x about 16.

East Malling Research Station.
December 6th, 1928.

FURTHER BRITISH RECORDS OF PROTURA.

BY H. WOMERSLEY, F.E.S.

I am very greatly indebted to Mr. C. B. Williams, of Amani, Tanganyika, for the opportunity of examining and reporting on his collection of Protura. All his specimens were collected in the South-east of England between 1912 and 1914.

The slides, twenty-nine in number, contain specimens of one species new to the British Fauna and also some of a species first diagnosed by myself from Brockley Coombe, Somerset.

Acerentomon nemorale Womersley.

There are seven slides of this very distinct species labelled as taken 'in moss from base of tree, New Forest, Hants, 13/10/13.' It is interesting to note that while the types were found in rotten sap-wood, the New Forest specimens were in moss, as stated above.

Acerentulus tiarneus Berlese.

Five slides labelled 'in soil, Merton, Surrey, March and April, 1914,' appear to belong to this species, previously known only from Italy. The specimens were well extended, and measured 1,190 μ instead of the 1,240 μ given by Berlese. The value of TR is not determinable from Berlese's data, but in the specimens before me has a value of 4.6.

Eosentomon transitorium Berlese.

All the slides of *Eosentomon* belong to this species. There are six slides of seven specimens labelled 'in turf from Kettering, Dec., 1912,' five slides labelled 'in peat from Ringwood, Hants, Oct., 1913,' and six slides without any locality. As these slides are all balsam mounts, the arrangements of the dorsal abdominal setae are difficult to observe, and determination has been largely dependent on the value of TR, which is 4.2.

Sunny Meads, West Town, Som
December 26th, 1928.

Notes on species of Bledius.—The recognition by my friend Mr. B. S. Williams of a new species of *Bledius* (*antea*, p. 28), closely allied to but abundantly distinct from *B. atricapillus* Germ., has induced me to examine the series of specimens standing under that name in my collection. As I expected, all the examples from the Hampshire coast prove to be the new species, *B. praetermissus*; and this is also represented in the collection of the late Mr. G. C. Champion by specimens from Milford, Hants, and Budleigh Salterton, Devon. Most, if not all, the *B. atricapillus* in both collections were taken by myself at Upnor, Kent, in April, 1874, when I found the beetle in the utmost profusion in a large sand-pit close to the river Medway opposite Chatham Dockyard (*cf.* E.M.M., Vol. XI, p. 37). It is possible that this species is less strictly maritime in its distribution than its newly recognised ally.

At Milford *B. praetermissus* was found in numbers by the late Dr. Sharp and myself on the line of cliffs to the westward of the village, burrowing like *B. atricapillus* in vertical faces of fine sand, and accompanied not rarely by *B. opacus* Block. and *Dyschirius politus* Dej.; while *B. spectabilis* Kr. is to be met with plentifully in outcrops of stiff clay just above the shingle beach. Near Chewton Bunny, further to the west, *B. secernendus* Joy is common in moist level sand just above high-water mark, and *B. fuscipes* Rye occurred to me in some numbers on June 1st, 1921, in a similar situation about two miles east of Studland, Dorset.

In the Oxford district the genus is but poorly represented by three species only—*fracticornis* Payk., *opacus* Block, and *longulus* Er. All these occur commonly together in a limited space on Shotover Hill, Oxon, in company with *Dyschirius politus* Dej. and *D. aeneus* Dej.; and the two last-named *Bledii* are also common near Tubney and elsewhere in Berkshire in suitable situations.—James J. Walker, Oxford: *January 23rd,* 1929.

Coccinella decemguttata L.—This species was brought forward as an addition to the British List by Mr. Bullock (Ent. Mo. Mag. 1928, p. 104) on the strength of a single specimen swept at Killarney in June, 1927. The species, however, was included in the British List by Stephens (Illustrations of British Entomology, Vol. IV, p. 378) on a single specimen in his collection, taken in the West of England. exact locality unknown It is included in the Waterhouse catalogue of 1861. There is practically a hundred years' interval between the two captures, and, as the species is an easily recognisable one, not likely to be passed over in the field, I am afraid we must assume that the species is not indigenous, and that, however difficult it may be to explain the fact, in both cases the insects captured had been accidentally introduced into the localities in which they were found.—T. Hudson Beare, 10 Regent Terrace, Edinburgh: *December 21st,* 1928.

Aleochara discipennis, Muls. and Rey, in Cumberland.—In the spring of 1920 we decided to spend Easter at Keswick; we left home on March 27th in fine sunny weather, but by the time we arrived at Keswick, owing to a change of wind, heavy rain had set in and continued without a break till Good Friday, April 2nd, so in sheer disgust we packed up and returned home by the earliest train on the Saturday morning. Collecting was, under the circumstances, practically impossible. but on the 30th I managed, under an umbrella, to sift a small heap of flood-refuse. The whole take was eight specimens, but one of these at any rate was well worth bottling, as on my return home it proved to be *Aleochara discipennis.* Though more than eight years have elapsed since its capture, I thought, in view of the rarity of this species both in this country and on the Continent, it was desirable to put the capture on record. The only English records, as far as I know, are from Kent, Surrey, Hampshire and Devon.—T. Hudson Beare: December 21st, 1928.

Hydrothassa marginella L., v. *devillei Bullock.*—This variety was described by the late Mr Champion (Ent. Mo. Mag. 1914, p. 247), but not named, from a specimen sent to him by Mr. Bullock from Killarney.—T. Hudson Beare: *December 21st,* 1928.

Hemiptera from the neighbourhood of Minehead (Somerset).—The following species of Hemiptera were taken during a fortnight's stay at Minehead, during August last. Species of Heteroptera marked with an asterisk do not appear in

the list given for Somerset by the late Mr. E. A. Butler (1923), and seem to be new records for this county. I have seen no recent list of Homoptera for this locality.

HETEROPTERA: *Palomena prasina* L., common, Bossington, Minehead, Selworthy, Allerford and Porlock; *Piezodorus lituratus* F., not commonly seen, Bossington. *Troilus luridus* F., on oak, Hopcott (Minehead). **Syromastes marginatus* L., on dock, Allerford. **Corizus capitatus* Fab., a pair by sweeping, Allerford. *Myrmus miriformis* Fall., Minehead, Wooton Courtney. **Ischnorhynchus ericae* Horv., Minehead. **Macrodema micropterum* Curt., Minehead. **Plinthisus brevipennis* Latr., Minehead. *Scolopostethus affinis* Schil., on nettles, Allerford; **S. decoratus* Hhn., under heather, Minehead. Bossington. *Metacanthus puncticeps* Germ., Minehead. **Piesma quadrata* Fieb., under *Chenopodium*, Minehead. *P. maculata* Lap. Selworthy. **Dictyonota strichnocera* Fieb., Minehead. *Derephysia foliacea* Fall., plentiful, Wooton Courtney. *Physatochila dumetorum* H.S., on old blackthorn, Selworthy. *Nabis limbatus* Dhl., Minehead; *N. lativentris* Boh., Allerford; *N. major* Cost., Allerford, Minehead; *N. rugosa* L., Minehead, Selworthy, Bossington; *N. ferus* L., Minehead. *Temnostethus pusillus* H.S., on oak, Selworthy, Minehead. *Anthocoris nemorum* L., and *A. confusus* Reut., plentiful. *Tetraphleps bicuspis* H.S., Minehead. *Triphleps nigra* Wolff, on nettles, Minehead; **T. majuscula* Reut., Allerford, Minehead. *Microphysa elegantula* Baer, on Rowan, Selworthy. *Pithanus maerkeli* H.S., Porlock. *Phytocoris tiliae* F., Minehead; *P. longipennis* Flor., Bossington; *P. ulmi* L., Minehead; *P. varipes* Boh., Allerford, Minehead. *Adelphocoris lineolatus* Goez., Minehead. *Calocoris norvegicus* Gmel., Allerford. *Lygus pabulinus* L., Minehead; *L. contaminatus* Fall., Selworthy; *L. cerinus* H.S., Minehead; *L. kalmi* L., Allerford. *Plesiocoris rugicollis* Fall., Allerford. *Liocoris tripustulatus* F., Horner, Allerford. *Stenodema laevigatum* L., Allerford, Minehead; *S. holsatum* F. Minehead. *Trigonotylus ruficornis* Geoff., Allerford. *Miris dolobratus* L., Bossington. *Monalocoris filicis* L., Porlock, Selworthy. **Bryocoris pteridis* Fall., Horner *Macrolophus nubilis* H.S. Horner. *Dicyphus epilobii* Reut., Allerford; *D. stachydis* Reut., Allerford; **D. annulatus* Wolff, on *Ononis*, Minehead. *Campyloneura virgula* H.S., Minehead, Selworthy, Horner. *Cyllocoris histrionicus* L. Luccombe *Blepharidopterus angulatus* Fall., Selworthy, Horner. *Mecomma ambulans* Fall., Selworthy, Minehead. *Orthotylus flavosparsus* Sahl., Minehead; *O. ericetorum* Fall., Bossington, Minehead. *Heterotoma meriopterum* Scop., Allerford. *Malacocoris chlorizans* Panz., on hazel, Luccumbe. **Onychumenus decolor* Fall., among dry grass, Wooton Courtney. *Macrotylus paykulli* Fall., Minehead. *Psallus betuleti* Fall., Selworthy; *P. alnicola* D.S., Selworthy; *P. roseus* F., Selworthy; *P. salicellus* Mey., Selworthy. *Atractotomus magnicornis* Fall., Minehead. *Plagiognathus arbustorum* F., common. **Asciodema obsoletum* Fall., Minehead. *Gerris gibbifer* Sch., Selworthy *Acanthia saltatoria* L., Allerford. *Arctocorisa fabricii* Fieb. (*nigrolineata*), Minehead.

HOMOPTERA: *Aphrophora alni* Fall., Horner. *Philaenus spumarius* L. f. *leucocephalus* Gm., *marginellus* Fab., and *gibbus* Fab., Minehead; *P. exclamationis* Thunb., Bossington, Wooton Courtney; *P. campestris* Fall., Bossington. *Ulopa reticulata* Fab., under heather, Minehead (North Hill). *Megophthalmus scanicus* Fall., Minehead. *Euacanthus interruptus* L., Horner; *E. acuminatus* Fab., Minehead. *Batrachomorphus lanio* L., Minehead, Horner. *Oncopsis rufusculus* Fieb., Minehead; *O. flavicollis* L., Minehead, Horner. *Macropsis scutellatus* Boh., Minehead; *M. scotti* Edw., Minehead. *Agallia puncticeps*

Germ., Minehead *Acocephalus nervosus* Sch., Minehead; *A. albifrons* L., Bossington. *Eupelix cuspidata* Fab., Bossington, Minehead. *Doratura stylata* Boh., Minehead. *Rhytistylus proceps* Kbm., Wooton Courtney (in dry grass). *Athysanus sordidus* Zett., Bossington; *A. obsoletus* Kbm., Minehead; *A. plebejus* Fall, Minehead; *A. lineolatus* Br., Minehead. *Deltocephalus striatus* L., very plentiful on the links, Minehead; *D. argus* Marsh, Bossington. *Jassus mixtus* Fab, Selworthy, Minehead. *Thamnotettix prasinus* Fall., Selworthy; *T. splendidulus* Fab., Selworthy. *Limotettix stactogala* Am., on *Tamarix*, Minehead; *L. nigricornis* Sahl., Selworthy *Cicadula sex-notata* Fall., Selworthy. *Alebra albostriella* Fall., Selworthy. *Chlorita flavescens* Fab., Minehead *Eupteryx stachydearum* Hdy., Allerford; *E. atropunctatus* Goez., Minehead; *E. germari* Zett., on firs, Selworthy; *E. pulchellus* Fall., Minehead; *E. concinna* Germ, with the last, on oaks, Minehead. *Typhlocyba crataegi* Doug., Minehead. *T. quercus* Fab.. Minehead. *Zygina flammigera* Geoff., Selworthy; *Z. parvula* Boh., Allerford. *Cixius nervosus* L., Horner. *Issus coleoptratus* Geoff., in ivy, very plentiful, Selworthy, Allerford. *Kelisia vittipennis* Sahl., Minehead. *Conomelus limbatus* Fab., Selworthy. *Delphax pellucida* Fab., common amoung grass, Bossington, Allerford; *D. discolor* Boh, Allerford. *Dicranotropis hamata* Boh., Selworthy. *Psylla crataegi* Sch., Minehead; *P. nigrita* Zett., on fir, Minehead. *Psyllopsis fraxini* L, Minehead. *Trioza urticae* L., plentiful, Minehead, Horner.—James M. Brown, 176 Carter Knowle Road, Sheffield: *January 25th*, 1929.

Lipara similis Schn. at Wicken Fen.—During the past summer I have bred from reed stems, gathered in Wicken Sedge Fen, a number of specimens of the Chloropid fly, *Lipara similis* Schn., a species which has not hitherto appeared on the British listt. It is smaller than the better-known *Lipara lucens* Mg. and does not produce a conspicuous gall. Infected reed stems, however, although not swollen at all, generally have a characteristic appearance, and once this is recognised there is little difficulty in 'spotting' them. In the part of the Sedge Fen nearest Wicken village numbers of such stems may be obtained, as I have been able to verify last autumn.

Examination of the interior of infected stems gathered during November showed that, as in the case of *Lipara lucens*, there is a single larva in the top part of each stem. This larva lies head uppermost in the medullary cavity, into which it fits fairly tightly, being at this stage full grown. It has quite a distinct appearance The dorsal side of the three thoracic segments in front and the segment bearing the spiracles behind are coloured very dark, and an infuscation spreads to neighbouring segments. These dark patches at each end and its much smaller size distinguish it at once from the larva of *L. lucens*. A small percentage are found to be parasitised by single larva of an unidentified Ichneumonid. Nearly all stems which contain *L. similis* larvae are also infected by batches of small, pale orange Chloropid larvae, which, at least when the stem has dried, are always found in the hollow interior.

It is rather interesting that this fly, which is apparently common enough in that part of Wicken Fen most frequented by collectors, has up to now escaped notice. The explanation seems to lie in the habits of the adult fly, if they at all resemble those of *Lipara lucens*. The very noticeable galls formed by the latter are extremely plentiful in the fens, yet the adult, owing to its seclusive habits, is seldom seen or taken. Judging from the behaviour of reared specimens, it shows little inclination to fly, but crawls about the reeds and drops downwards when disturbed. I have noticed that it gets more active towards the evening If it were not for its galls, no doubt *Lipara lucens* would be liable

to escape notice. So with *Lipara similis*—but this species does not give itself away by producing conspicuous galls

Mr. A. P. G. Michelmore, of Trinity College, has shown me two specimens which he has found among flies swept at Wicken, one in 1926 by Drainer's Dyke, and one last year in Harrison's Drove. Also one which was bred from reed stems in 1926. The fly emerges in June. I am much indebted to Mr. J. E. Collin for identifying the species.—G. M. SPOONER, Christ's College, Cambridge: *January 23rd*, 1929.

Embioptera from Baghdad.—With reference to Dr. Scott's introductory note to Mr. Esben-Petersen's paper in the January number of this Magazine, I may mention that the insects belonging to the above Order collected by my friend Mr. W. Edgar Evans in Mesopotamia were dealt with by Professor Silvestri in Trans. Ent. Soc. London, 1923, pp 261-2. Two species are recorded: *Oligotoma nigra* Hagen and *Embia persica*, figures of the apical part of the abdomen (♂ from above, side and beneath) of the latter species being given on pl. x. Silvestri suggests that *E. persica* may be only a variety of *E. savignyi.* The winged males of both species 'came to light' at Amara. Both were also found under clods of earth, and immature females of *E. persica* were taken. I have not seen Hagen's description of *O. nigra* and, as I have no material, I cannot say whether the specimens recorded by Silvestri under the name are the same as those just described as *O. mesopotamica*, but it is likely that this will prove to be the case.—KENNETH J. MORTON, 13 Blackford Road, Edinburgh: *January 9th*, 1929.

Reviews.

'THE BUTTERFLIES AND MOTHS OF NEW ZEALAND.' By G. V. HUDSON, F.E.S., F.N.Z. Inst., etc. 4to, pp. xi, 386, Frontispiece, Plates A—K, I—LII New Zealand: Ferguson and Osborn, Limited, 202 Lambton Quay, Wellington. 1928.

As long ago as 1898 Mr. G. V. Hudson, F E.S., of Wellington, New Zealand, published in London a thin quarto volume with thirteen plates, eleven of which were in colour, under the title 'New Zealand Moths and Butterflies (Macro-Lepidoptera).' This book, of which a review appeared in the pages of our Magazine soon after its appearance (Ent. Mo. Mag., Vol X, p. 274), was duly appreciated in its own country, as well as in ours, as being the first attempt to provide a comprehensive survey of at least the larger forms of the New Zealand Lepidoptera; and as a substantial contribution to the knowledge of an insect fauna unrivalled in interest and importance in the whole world, it has proved of very great value to Entomologists in general, and to those of the Dominion in particular.

Now, after the lapse of nearly thirty years, the book reappears under a slightly modified title, enlarged and improved almost beyond recognition. Instead of the 238 species included in the earlier work, the number now dealt with is augmented to no fewer than 1,271, of which all but 93 are peculiar to New Zealand; and even of these latter, at least 29 have been introduced by human agency, and 8 are cosmopolitan species. This great increase is in part due to the numerous discoveries of new forms of Macro-Lepidoptera in recent years, 402 species being now known in this section; and more especially to the inclusion of the so-called 'Micro-Lepidoptera,' the members of which may be regarded as forming one of the most distinctive and important elements of the New Zealand insect fauna.

The descriptive treatment of the species is comprised in 325 pages printed in double columns, and is mainly on the lines of that of the earlier work, though a full synonymy and, in many cases, more ample details are given, and the exceedingly interesting life-histories of many of the insects are a notable feature of the book. In this place it is not possible to refer more particularly to these bionomic details, but we cannot refrain from drawing attention to the account of the metamorphoses of the most conspicuous of the New Zealand moths, the great green *Hepialus virescens* Dbld. Of the butterflies, which are here restored to their traditional place at the head of the Lepidopterous series, fifteen species are enumerated as occurring in the Dominion; the only addition made to the number in recent years being the Australian form *petilia* Stoll. of the wide-ranging *Limnas chrysippus* L., of which a few specimens have succeeded in reaching the shores of New Zealand, as is also the case with '*Deilephila*' *celerio* L., another very widely distributed insect in the Indo-Pacific region. *Vanessa* (*Pyrameis*) *ida* Alfk. of the Chatham Islands is treated as a race of the mainland *P. gonerilla* F., and we find no mention of *Lycaena* (*Neolucia*) *oxleyi* Feld., which was included and figured in the earlier work, and to ourselves at least appears to be a distinct and well-marked species.

Only a single addition, the inconspicuous little Arctiad *Celama parvitis* Howes, has been made to the very small number included in the section formerly known under the convenient title of the Bombyces, in which the great gaps in the fauna are so conspicuous. The number of the Noctuid moths has, however, been increased from 74 species in the earlier work to 136, and that of the Geometridae from 128 to 243. The latter group 'forms an outstanding feature in the Lepidopterous fauna of New Zealand, being surpassed in number only by the Tineina, and in beauty of varied pattern and delicacy of colouring, many are excelled nowhere else in the world.'* The striking affinity of the New Zealand Lepedoptera with those of South America, long ago pointed out by Mr. Meyrick and others, and now regarded as strong confirmatory evidence of a connection with that continent in past geological ages by an Antarctic land-bridge, is perhaps the most evident in this section.

Passing on to the Micro-Lepidoptera, while we find, as in the other main divisions of the Order, that most of the Pyralid families are altogether unrepresented, except by a few stragglers or immigrants at most, *Crambus* and its near allies and *Scoparia* are, in the words of the author, 'so disproportionately developed that the Pyralidae as a whole form almost eighteen per cent. of the entire Lepidopterous fauna.' The latter genus, indeed, comprises no fewer than 104 species peculiar to the Islands, which exhibit a diversity of pattern and colouring which is quite startling when compared with our plain-looking British forms, many of the New Zealand species being really beautiful insects. The Tortrices number 137 species, and the Tineina, to which in recent years much attention has been devoted, no fewer than 452; the Oecophorides, as in Australia, being a predominant feature. Both groups include many forms of extreme beauty and interest, and this remark also applies to the twenty species of the Hepialidae, which family was included in the earlier work. The last and most primitive section of the Lepidoptera, the Micropterygidae, is specially well represented by 23 out of some 72 known species, the genus *Sabatinca*, almost confined to New Zealand, being the most ancient generic type of the entire Order.

As the author gracefully acknowledges, the systematic portions of the work have been almost entirely founded on the descriptions of genera and species of

* Proc. Ent. Soc. London, 1920, p. cxviii

the New Zealand Lepidoptera by Mr. E. Meyrick, which have appeared, chiefly in the Transactions of the New Zealand Institute, from 1883 onwards. A brief but very interesting 'Historical Sketch' of the progress of our knowledge of this wonderful insect fauna from the days of Captain Cook and Sir Joseph Banks to the present day is followed by a chapter in which are detailed the various methods of collecting, preserving, and observing butterflies and moths, as adapted to the conditions prevailing in New Zealand, the most favourable localities in the Islands being also indicated. The general characters and structure of the Lepidoptera are briefly but adequately outlined in Chapter II, and the two succeeding chapters embody a most interesting discussion of the habits and geographical distribution, and of various bionomic aspects of the Order as represented in the Dominion. Classification, nomenclature, and general remarks form the subjects of Chapter V, and a census of the New Zealand Lepidoptera appears on p. 372. Miss Stella Hudson has compiled a list of the principal indigenous trees, shrubs, and plants mentioned in the body of the work, including brief descriptions and references to the insects attached to each one, which forms a valuable and interesting Appendix, and a very full Index concludes the whole.

It now remains to speak of the illustrations. Structural and neurational details of many generic types are presented in the first nine plates, and of the 52 plates in colour four are devoted to the earlier stages and the remainder to the perfect insects. In these all but a very few of the species are represented by the author's faithful and characteristic coloured drawings, which together present a veritable monument of his industry and skill. As in the majority of cases both sexes of the insects are shown, as well as many of the more striking variations, the number of specimens figured cannot be far short of 2,000. These four-colour plates are produced by a well-known English firm, and, taken as a whole, are a decided improvement on the chromo-lithographs of the earlier work, those including the Tineina being especially pleasing, though the colours may, in some cases at least, be considered as being possibly a little more brilliant and decided than in nature

The paper, printing, and binding of this noble volume leave nothing to be desired, and present a striking example of the excellence of the work of this nature which the Dominion is capable of producing. Our hearty congratulations go out to the veteran Entomologist of New Zealand on the successful completion of this great contribution to the literature of our Science after so many years of strenuous work and patient study.—J.J.W.

'Cardiff Naturalists' Society. Report and Transactions.' Vol. LX. 1927.

The 'Diamond Jubilee' number of the organ of this active local society contains as its principal Entomological feature an excellent and comprehensive annotated List (pp. 33-67) of the Hymenoptera Aculeata of Glamorgan, compiled by our esteemed correspondent Mr. H. M. Hallett, F.E.S., and to a large extent based on his own captures and observations on the Order. As might have been supposed from the varied character of the county, with its extensive range of coast sandhills so favourable to these insects, the Aculeates are well represented by 289 out of the 453 species recognised as British, or sixty-four per cent. of the total number. The list includes a good many local and uncommon forms, notably the exceedingly rare *Pseudogonalos hahni* Spin., and, besides localities, interesting bionomic notes are appended to many of the species. On pp. 72-74 Messrs. Hallett and Norton enumerate the additions to the published lists of Glamorgan insects made during the previous year, but in these no Coleoptera are included.

'Transactions of the Carlisle Natural History Society.' Vol. IV. 1928. Carlisle: Published by the Society.

At least half the bulk of the present issue of the Transactions of this Society is devoted to Entomological subjects, and of these the most important item (pp. 23-65) is the concluding section of the list of the Lepidoptera of Cumberland, from the Pyralides to the Tineae inclusive, by Mr. G. B. Routledge, F.E.S. The number of species of the Order recorded from Cumberland is now brought up to a total of 1,002, which is rather less than half of those included in the British list; but further research, especially as regards the Tortrices and Tineina, will assuredly result in numerous additions being made to the insects of those groups already known to occur within the limits of the county. The Orthoptera, of which there are records of 14 species out of 31 recognised as indigenous to Britain, are also dealt with by Mr. Routledge. The catalogue of Cumberland Hemiptera-Heteroptera by Mr. F. H. Day, F.E.S., comprises 214 out of 475 British species; comparatively few of the larger and more conspicuous forms of the Order appear to range so far northwards, but the aquatic members (*Corixa* etc.) seem to be much better represented. Mr. Day also gives interesting details of the Odonata, of which only 13 species—about one-third of our dragon-fly fauna—have as yet been recorded from Cumberland; but the additions made, chiefly by himself, to the County list of Coleoptera since the publication of the last instalment raise the number of known Cumberland beetles to the excellent total of 1,820 species.

Obituary.

Oliver Richardson Goodman.—It is with very deep regret that we have to announce the death of Oliver Richardson Goodman, which took place at his residence at Horley on January 5th, at the early age of 52. Born at St. Ives, he was a descendant of an old Quaker family. all of whom were keenly interested in the Fen country, in particular the drainage and reclamation of otherwise useless ground. He was educated at Paradise House School; on leaving, he intended taking up architecture as a profession, so to get a thorough understanding of this, his father apprenticed him as a carpenter and joiner, prior to being articled to one of the leading architects of the day. Beneath a kindly and genial exterior was an indomitable spirit, which enabled him to carry out the onerous duties entailed by the management of the large estates of St. Bartholomew's Hospital. This spirit enabled him to hide from all but his most intimate friends the internal trouble which caused him so much suffering during the last few years of his life. He was particularly interested in the Rhopalocera, an inherited trait, as both his father and uncle were keen naturalists. Little known prior to the war, owing to the pressure of business, he had not much time for entomology; but after the Armistice he joined the Zoological, Entomological and South London Entomological Societies. He was particularly interested in the welfare of the latter, and rapidly became known to a large circle of entomologists, and only a week or two before his death he was elected one of the Vice-Presidents. In co-operation with his son, Mr. A de B. Goodman, he made regular yearly trips to various parts of the Palaearctic Region and rapidly amassed a very large collection of the Rhopalocera. The funeral took place at Golder's Green on January 10th, the ceremony being carried out after the usage of the Society of Friends, a large number of entomological friends attending. He leaves a wife and son to mourn his loss, to whom we would offer our deepest sympathy.—Thos. H. L. Grosvende.

ON THE AUSTRALIAN THYSANOPTERA ALLIED TO THE GENUS *ODONTOTHRIPS* UZEL.

BY RICHARD S. BAGNALL, F.R.S.E., F.L.S.

I have already described three Australian species of the *Odontothrips* group, and thanks to Mr. Reginald Kelly's further perseverance and researches, I have received two further species, which I now describe.

The characters of one of these, *Odontothripoides morisoni*, caused me to re-examine the old material, with the result that a character I had overlooked shows that none of the Australian species fall into the true genus *Odontothrips*, and I have therefore found it necessary to diagnose two new genera.

All the Australian species have both fore-tibial spurs well developed and the sense-cone of the antennal segment 6 adpressed.

I take the opportunity of naming a new American species in an addendum.

TABLE OF GENERA.

Sense-cone on antennal segment 6 ad-pressed; apex of fore-tibia armed with two spurs, one sometimes, but both rarely vestigial; both veins of fore-wing usually furnished with seta for their entire length.

1. Pronotum furnished with two long bristles at each hind angle. Species chiefly European .... Genus *Odontothrips* Uzel
   Pronotal chaetotaxy otherwise. Species Australian 2
2. Pronotum furnished with one long bristle at each hind angle; wings long and slender, fore pair with the upper vein regularly set with setae for its entire length; and abdomen as in *Odontothrips* .... Genus *Odontothripiella* nov.
   Pronotum without long bristles at hind angles; upper vein of fore-wing regularly set with setae in the basal half only; end of abdomen sharply produced as in *Oxythrips*. ....Genus *Odontothripoides* nov.

Genus *Odontothripiella* nov.

As in *Odontothrips* Uz. , but having only one long bristle at the hind angles of the pronotum.

♂. In the one species, *australis* Bagn., where the male is known, tergite 8 is medianly produced into a pair of long, backwardly directed arms considerably longer than the median length of the tergite.

The Australian species *Odontothrips fasciatipennis, australis* and *bispinosus* Bagn., as well as the species now described belong to this section.

TYPE: *O. fasciatipennis* (Bagn.).

TABLE OF SPECIES.

1. Fore-wings clear with exception of a brown band just below the basal third .... *fasciatipennis* (Bagn.)
   Fore-wings entirely greyish-brown, with a patch near base lighter 2
2. Posterior angles of abdominal segment 9 produced into a pair of strong backwardly directed spines .... *bispinosus* (Bagn.).
   Abdominal segment 9 normal .... 3.
3. Size larger, bristles longer and not so fine, wing setae more numerous .... *australis* (Bagn.).
   Size smaller, more fragile, bristles shorter and finer and wing setae fewer ....*gracilis* sp. n.

Odontothripiella australis (Bagnall).

In the following further records it should be noted that those from Ringwood are a larger and less fragile form than the true *australis*, but though this is apparent to the naked eye, I have been unable to discover any structural differences.

Victoria, Ringwood, 14 miles east of Adelaide, 1 ♀, Melbourne ♀ ♀ only on Gorse, 9.vii.1923; and S. Australia ♀ on *Daviesia*, and Adelaide Hills, both sexes on *Pultenia*, 10.x.1926 (R. Kelly).

Odontothripiella gracilis sp. n.

♀. Length about 1.12 mm., breadth of pterothorax c.0.235 mm.

Very near *australis*, smaller and more slender, with all bristles noticeably shorter and finer and antennae shorter.

Length (and breadth) of head and pronotum, 108 (142) and 136 (184) μ respectively; of the postero-angular pronotal setae, 62 μ; and of the apical abdominal bristles 93 to 100 (as compared with 137 to 156 μ in *australis*).

Relative lengths (and breadths) of antennal segments 3–8 approximately as follows:—

gracilis—50 (21.5) : 45 (19) : 31 (18) : 47 (19) : 7.5 : 9 μ
australis—56.2 (22.5) : 56.2 (22.5) : 36.2 (19.3) : 54 (20) : 9 : 10.7 μ.

Length of fore-wing (and breadth near middle) 775 (45), as compared with 900 (55) μ in *australis*. Number of setae on costa, upper vein and lower vein, 25, 17 and 20 respectively, as compared with c.30, 23 and 23 in *australis*, the approximate length of these setae near middle of wing being 37, 27 and 32 in *gracilis* and 40, 37 and c.45 μ in *australis*.

S. AUSTRALIA, Remmark, 1 ♀ on Sweet Alyssum (presumably casual), 3.x.1926 (R. Kelly).

Genus *Odontothripoides* nov.

Near *Odontothrips* Uzel and, as in that genus, with the exception that the pronotum is devoid of long bristles at hind angles, the end of the abdomen is pointed as in *Oxythrips*. whilst the setae of the upper vein of the fore-wing do not continue into the distal half of wing, leaving a long space devoid of bristles terminated by two distal setae.

♂. Posterior margin of tergite 8 with a strongly chitinized median band supporting a pair of short, stout tubercle-set spines flanked by a pair of long, stout bristles.

TYPE: *Odontothripoides morisoni* sp. n.

Odontothripoides morisoni sp. n.

With the characters of the genus.

Length 1.3 mm., breadth of pterothorax 0.26 mm. Colour dark brown, end of abdomen black-brown, fore-tibia yellowish shaded to brown basally and laterally, all tarsi yellowish. Antennae with joints 1 and 2 concolorous with head, 5-8 dark blackish-brown, 5 with a pale ring near base; 3 and 4 yellow, 3 shaded lightly with grey and 4 with greyish-brown deepening distally. Fore-wings lightly fumate, paler near base.

Head not quite as long as broad; interocellar bristles small; antenna normal. Pronotum slightly longer than the head and about 1.33 times as broad as long; posterior margin furnished with about seven pairs of setae of varying sizes. Wings with 22–25 costal setae, lower vein with 15 and upper vein with 3+6–7 in the basal half and two at tip.

Abdomen elongated, apex sharply pointed from segment 8, which is roundly narrowed basally, with segments 9 and 10 sharply obconical.

Length (and breadth) of head and pronotum, 125–130 (145–150) and 150–200 μ respectively; length (and breadth near middle) of the fore-wing, 800 (58); length of abdominal segments 9 and 10 (which is dorsally split) 92 and 105, and of the bristles on 9 and 10 (dorsal pair) 138–150 and 125 μ respectively.

Relative lengths of antennal segments approximately as follows:—

58 (24 5) : 55 (24) : 40 (21) : 56 (21) : 10 : 14 μ.

♂. Tergite 8 as characterised for the genus; outer posterior angles of 9 acute and set with a long, dark, stout, recurved bristle (c. 110–112 μ long) and a secondary lighter, more slender, less curved, but equally long bristle nearby.

Hab. S. AUSTRALIA, Clare, both sexes on *Goodenia*, 14.x.1926, in company with *Thrips imaginis* Bagn. ♀♀ and 1 ♀ of *Isoneurothrips australis* Bagn.

Named in honour of my friend Guy D. Morison, Ph.D.

ADDENDUM.

The American species of *Odontothrips* recorded as *O. phaleratus* is not referable to that species and may be named as follows:

Odontothrips morgani sp. n.

1913 *Euthrips phalerata* Morgan (*nee* Haliday), Proc. U.S. Nat. Mus., 46, No. 2008, p. 1, figs. 1-4.

A study of Morgan's description cited above shows that the species differ from the European *O. phaleratus* Hal. (*anisomerus* Bagn.). It is paler in colour than *phaleratus*, the third antennal joint is normal in form, the armature of the fore-tibia and the chaetotaxy of the fore-wings differ, the former having two conspicuous teeth and the latter a long series (28-31) of costal seta as compared with 18-20 in the true *phaleratus*. Moreover the fore vein has not the long space devoid of setae seen in *phaleratus* (*vide* description of *anisomerus*), whilst the hind vein is furnished with 14 to 16 setae as compared with 10-12 in *phaleratus*.

Edinburgh.

January, 1929.

A MUCH-NEEDED LINE OF INVESTIGATION IN BRITISH ENTOMOLOGY.

BY B. P. UVAROV AND W. E. CHINA.

In his Presidential Address to the Entomological Society of London, delivered at the Annual Meeting on January 16th last, Mr. J. E. Collin, while drawing attention to the great need for the adequate organisation of Entomological science, made the following statements :—

1. 'One cannot but admit that a considerable proportion of all this collecting work is wasted effort, due partly to the collectors themselves and partly to the lack of organised co-operative effort in dealing with the material collected.'

2. 'The collecting instinct is very strong in many people; it often only requires directing into the right channels to become useful . . . let those with the necessary knowledge of the various entomological problems capable of being solved by work in the field lose no opportunity of pointing them out to their less well-informed collecting friends, and so pave the way to greater co-operative work between collector and taxonomist.'

Taking Mr. Collin at his word, we venture to offer a suggestion as to how his general idea may be applied in practice.

There are undoubtedly numerous collectors who, for want of organisation, are wasting precious time in covering over and over again the ground which has been worked now for some hundred years or more. Apart from the desirability of persuading young collectors to devote their attentions more to the less known orders of insects, it is a recognised fact that although a great deal of faunistic work has already been done, and more or less complete county and local lists have been published, little or nothing has been done from the *ecological point of view*. This, then, is the crying need in British Entomology at the present time. It must be admitted that the ecological study of entomology in Britain is somewhat complicated by the more or less complete alteration which the fauna and flora has undergone in many parts of the country. In spite of this, however, there still exist many places in which definite animal and plant associations exist in an original condition, and, in view of the fact that the great extension of commercial and industrial enterprises is likely to bring about a rapid obliteration of many of these natural reserves, it is all the more urgent that a complete study of these areas should be made as soon as possible. In other regions artificially produced associations have existed for many years, and have resulted in an ecological balance which it would be extremely interesting to compare with that existing in similar but natural associations on

the continent. As an example might be mentioned the pine woods of Southern England which have sprung up since Roman times.

Apart from the purely scientific interest attached to the ecological study of entomology in this country, there is the added value that it will undoubtedly throw much light on economic problems, such as the incidence of disease in both crops and herds, and even in man himself.

It may not be out of place to describe briefly the fundamental principles involved in such a study. Ecological work, accessible to individual entomologists with restricted amount of time at their disposal and not requiring special apparatus may be of many different kinds. Very interesting results may be obtained, for instance, by thorough studies of all intects associated with a single species of plant throughout the season, or during several successive seasons, either in one locality or in several. Still more interesting are studies on the entire insect population of some typical habitat, *e.g.*, of a definite plant association. It must be specially stressed, however, that the ecological work becomes of real interest and importance only when, at least, roughly quantitative methods are applied, *i.e.*, when collecting is done in such a way that not only the presence of certain species is revealed, but also their relative scarcity or abundance estimated. In the work on the population of certain botanical association, *e.g.*, of grassland, this may be attained, for example, by having always a definite number of 'sweeps' by net, putting everything caught in the killing bottle, and counting the number of each species. A much more exact, though more laborious, method is to take census by sample squares; to do so, an iron frame, say, a foot square, is taken, to the top of which a bag is attached; the frame is dropped on the selected spot, pressed down, the roots of plants under it cut out by a spade, and the whole of the top layer of soil and the plants thrust into the bag, which is then carried home, where its contents can be thoroughly analysed on a white dish or paper. A series of quantitative records of collecting done either in various habitats, or in the same habitats, or in the same habitat throughout a whole season, would reveal the changes of insect population according to the differences in habitat or to the seasons. In this way interrelations of various insect associations may be studied, seasonal movements established, and a glimpse into the actual life of the enormously complicated social organism of animal communities obtained. The entire vast field of ecological work is as yet practically unexplored, and every entomologist can make real contributions to the science by taking up ecological studies, *i.e.*,

not concentrating on a mere acquisition of specimens, but attempting to find out the relation of insects to the environment and to each other.

The problems and methods of ecological work are only suggested here, but, of course, not exhausted, and the writers would be glad to supply additional information to those applying to them at the British Museum (Natural History), London, S.W. 7.

January 29th, 1929.

ATHETA (*DRALICA* M. ET R.) *RIGUA*, A STAPHYLINID BEETLE NEW TO SCIENCE.

BY B. S. WILLIAMS.

Atheta (*Dralica* M. et R.) *rigua*, sp. nov.

Narrow, subparallel, subdepressed, moderately shining, pitchy black, apex of abdomen lighter, thorax and elytra brown, antennae reddish testaceous, maxillary palpi and legs testaceous.

Head black, oval, moderately transverse, very finely and somewhat diffusely punctured and pubescent, centre of the disc with a circular depression. Temples margined, their length when viewed from above exceeding somewhat that of the eyes which are slightly prominent. *Antennae* slender, reaching beyond base of thorax, gradually and feebly thickened from base to apex, joints 1-3 elongate, 1 slightly longer and thicker than 2, 2 and 3 subequal, 4 feebly transverse, 5-10 equal in length, gradually increasing in width, 9 and 10 about $1\frac{1}{3}$ times as broad as long, 11 pointed, as long as 9 and 10 together. *Thorax* transverse, almost $1\frac{1}{8}$ times as broad as long, as wide and as long as head, finely and closely scultpured* and pubescent, median line very obsolete and scarcely indicated, the disposition of the minute asperities confused. *Elytra* slightly broader and about $1\frac{1}{8}$ times as long as thorax, $1\frac{1}{4}$ times as broad as long, closely pubescent, sculpture as in thorax but the asperities coarser and arranged in irregular transverse rows. *Hind body* subparallel, much more diffusely sculptured and pubescent than elytra, the first three free tergites more closely sculptured and pubescent than the apical ones Length 1.7-1.8 mm. Male with the 6th free tergite simple, the 6th sternite rounded and produced. Female with the 6th free tergite simple, the 6th free sternite with a narrow triangular excision in the middle of the apical edge.

Type in the National Collection at the British Museum.

A. rigua is very similar to *A. vilis* Er., and in collections will probably be found mixed with or doing duty for this species, but despite the close affinities of the two once their differences are appreciated their separation becomes a matter of no great difficulty. The following are the chief points of difference :—

	rigua.	*vilis.*
Size.	1.7-1 8 mm.	2-2.2 mm. (Ganglbauer's measurement of *vilis*—1.5-1.7 mm.—is too small.)

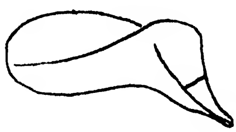
* With the exception of the head, the sculpture of this species and of the closely allied *vilis* takes the form of minute granules or asperities, not punctures. It would seem preferable to limit the term puncturation to depressions in the surface and to use the term granulation for elevations. In order to appreciate the formation of the sculpture, the specimen should be observed through a Greenhough pattern binocular microscope, aud magnification of at least 40 diameters used : it is best seen when the head of the specimen is pointing away from the observer and tilted downwards. The specimen should be strongly illuminated by light directed on to the head and in the line of the longitudinal axis.

Antennae.	More slender, shorter, paler in colour, penultimate joints more transverse.	Stouter, longer, colour dark, paler at base, penultimate joints less transverse.
Thorax.	Only as wide as head, sculpture finer.	Wider than head, sculpture less fine.
Elytra.	Sculpture finer.	Sculpture less fine.
Legs.	Shorter.	Longer.
Secondary sexual characters.		
Male.	6th free tergite (when dissected) distinctly transverse, almost $1\frac{1}{2}$ times as broad as long.	6th free tergite (when dissected) almost as long as broad.
Female.	6th free sternite with narrow triangular excision in middle of apical margin.	6th free sternite simple.

There are distinctive differences in the shape of the aedeagi and spermathecae; these need not be described, as they are figured below.

In my experience *A. rigua* is a commoner species than *A. vilis*, though both are very local. I have taken the former on two occasions in flood-refuse—Hurn, Hants, 1926, not uncommon, Earith, Cambs., 1926, two specimens. Its true habitat is, I believe, in swamps, as I have met with it on various occasions when working a small marsh near St. Albans. It occurs there sparingly in grass tufts, but it is to be found in larger numbers by working the marsh in summer and early autumn when the water has dried up, leaving a layer of damp refuse at the bottom. It is within this layer that *A. rigua* is to be found, sometimes in fair numbers, accompanied by the much scarcer *A. vilis*.

Dried swamp bottoms are very interesting and profitable to work, and I hope to give shortly an account of the various species met with in these habitats.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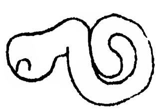
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4.

Explanation of Figures.

1. Median lobe of aedeagus of *A. rigua* (lateral view).
2. Median lobe of aedeagus of *A. vilis* (lateral view).
3. Spermatheca of *A. rigua*.
4. Spermatheca of *A. vilis*.

15 Kingcroft Road, Harpenden.
February 7th, 1929.

NOTES ON SOME BRITISH ACULEATE HYMENOPTERA, INCLUDING FIVE SPECIES NEW TO BRITAIN.

BY R. C. L. PERKINS, D.SC., F.R.S.

The species of the subgenus *Diphlebus* (*Cemonus*) of *Pemphredon* have probably not attracted any very special attention in this country, and it has long been known to me that we have some which are not given in British lists. The following table gives distinguishing characters for all the species known to me:

♂♂

1. The rugose anterior area of the propodeum is separated from the rugose or closely punctured part behind by a smooth space, usually shining, but occasionally more or less dull from microscopic surface sculpture .... 2.
   There is no smooth space on the propodeum, the part occupied by this in other species being strongly rugose .... *rugifer* Dahlb.
2. The second and third ventral segments are simple, without a distinct apical impression extending some distance in front of the apical margin .... *shuckardi* Mor
   Second and third ventral segments with their yellow apical margins rather widely impressed, so that in some aspects a slight, but quite distinct and often arcuate, ridge is formed well in front of the margin 3
3. Smaller species—most of those measured were well under 7 mm. in length—scutellum more or less shining; under a strong lens rather finely punctured, the punctures often shallow, ill-defined or with indefinite outlines; emargination of clypeus shallow (its true nature cannot be seen without denuding it of hairs) ... *lethifer* Sh.
   Large species; the scutellum with dense, coarse punctures, the clypeus with a large and deepish emargination .... *wesmaeli* Mor.

♀♀

1. Propodeum rugose all over, without a smooth space .... *rugifer* Dahlb.
   Propodeum with a smooth space between the rugose anterior area and the posterior part, which is either rugose or much punctured 2
2. Apical margin of the clypeus somewhat produced and raised in the middle, so as to appear bluntly pointed there. (This is easily seen if the clypeus is viewed from the base, but care must be taken to distinguish the clypeal margin from that of the labrum, which usually continues its outline.) .... *shuckardi* Mor.
   Apical margin of clypeus broadly rounded or truncate, or else it is emarginate in the middle .... 3.
3. Propodeum along the posterior edge of the smooth space with shallow punctures, sometimes with rugulosity of the surface, but individual punctures are always distinct and separated towards the middle. Size smaller than that of the following (clypeus subtruncate apically) .... *lethifer* Sh.
   Propodeum densely rugose-punctate or rugose along the hind edge of the smooth space .... 4.
4. Apical margin of the clypeus with a large, deep, subsemicircular excision in the middle .... *wesmaeli* Mor.

Apical margin of the clypeus with a small shallow median emargination or hardly more than a slight impression in the middle ...... *scoticus* sp. n.

I have not seen a ♀ example of *rugifer* nor a ♂ of *scoticus*. It is hardly likely that the latter will prove to be distinct finally from some of the European species, but as I have been unable to secure authoritatively named specimens of some of these, I am unable to identify our species. A German specimen which was received as *wesmaeli* is very similar, but does not altogether agree. Comparing *scoticus* with what I believe to be true *wesmaeli*, the latter appears to have the mesonotum on the whole more shining, the first and second tergites are more distinctly punctured, second sternite more polished, more convex and with larger and less shallow puncturation. Whether these characters of sculpture will prove constant when a series of both species is examined is uncertain, for hitherto no such comparison has been possible. So far as I know, both *rugifer* and *scoticus* have only been found in Scotland. Mr. B. S. Harwood has a fine specimen of the latter captured by his brother at Aviemore, and I have seen one or two others, and have possibly in past years named such Scotch specimens wrongly as *wesmaeli*, on comparison with the very similar German specimen above mentioned. Mr. Harwood has taken true *wesmaeli* in Essex, and I am indebted to him for a pair of this species, which I have only myself once met with. This was in 1899 on the railway bank near Fordham station, when I was returning to Cambridge from Wicken Fen. Mr. H. P. Jones tells me that he found it common in Hampshire, but no longer possesses the specimens.

It should here be stated that on the Continent *Pemphredon luctuosus* Sh. has been accepted as a good species, and if Shuckard's type is identical with the others, this species should be reinstated in our lists. Very many years ago I took an occasional specimen agreeing with the original description, but as Saunders was satisfied that Shuckard's species was a mere variety of *lugubris* no special attention was paid to the matter, and the specimens are no longer available. The Continental *luctuosus* is easily distinguished by the structure (in the ♂) of the middle pair of legs, but neither Shuckard nor Saunders noted any special character in the British examples in this respect.

The ♂♂ of *shuckardi* and *lethifer* sometimes closely approach one another in the sculpture of the propodeum, the well-marked differences exhibited by their ♀♀ being hardly evident. It is, therefore, safer to separate the ♂♂ by the very distinct difference

shown by the apices of the sternites, as given in my table. Adlerz has found the nest of *wesmaeli* stored with Psocidae.

For some years I have known that there were evident and, apparently, specific differences in the characters of the last sternite of the ♂♂ of our *Priocnemis pusillus,* and I have now dissected a series of specimens and made a minute examination of this sternite for comparison with the descriptions and figures given by Haupt in his recent work on the species of North, Middle and East Europe. It appears to me that we have all four of the species described by this author as constituting the '*pusillus*' group. The following brief table may enable collectors to separate the species, but it is necessary that the specimens should be absolutely clean and the hairs of the eighth sternite not disarranged. The apical sternite should be entirely exposed, as it is often largely withdrawn beneath the preceding ones. The relative length and breadth of this sternite is of some importance, but there is considerable individual variation in some species.

1. Last sternite subcordiform, with long fringe of hairs at the sides, these hairs directed obliquely backwards; the surface is copiously punctate almost all over, dull or little shining. (Outer processes of the genitalia on the outer edge with close-set fringe of setae on the basal part, then with a space with only one or two setae, and again with numerous setae on the apical portion.) .... *cordivalvatus* Haupt.

   Last sternite not so greatly widened at the apex as to be cordiform .... 2.

2. Surface of last sternite at least for the most part dull under a strong lens, with traces of feeble punctures amid the surface sculpture, under high powers for the most part reticulately sculptured; the hair fringe rises obliquely from the surface and is directed apically. In the specimens examined the relative length and breadth of this segment varies considerably in individuals. The outer processes of the genital armature have an almost regular fringe of setae from base to apex .... *pusillus* Schiödte

   Surface of last sternite well punctured, in a good light shining between the punctures over all, or nearly all, the surface .... 3.

3. Last sternite widening to a little beyond the middle, then narrowing to the apical margin, hair fringe vertical or nearly (apparently not well developed around the apical margin); puncturation much more remote; the fringe of hairs on the outer process of the genital armature is not or hardly interrupted before the apex, and some at least of the bristly hairs are distinctly curved at the thin tips (like those of the sternite) even when viewed under a strong lens .... *schiödtei* Haupt

   Last sternite widening to near the apex; hair fringe vertical or nearly, but denser, and almost equally developed around the apex, puncturation comparatively close; genital armature with the outer fringe irregular or interrupted before the apex, and the hairs themselves appear rather different in character .... *gracilis* Haupt.

The forms whch I refer to *gracilis* and *pusillus* are perhaps commoner. I have dissected specimens of the latter from Yorkshire, the Devon Coast and Dartmoor; the former from the New Forest and elsewhere. The single ♂ of *schiödtei* was collected by Dr. Arnold in the New Forest in 1906, and a single female, taken there at the same time, with the propodeum distinctly less dull than is usual in what we have considered *pusillus*, probably belongs to the same. Of *cordivalvatus** I have examined only one male from F. Smith's collection, where it was placed as *exaltatus*. Of his series of twenty-eight specimens so named, fifteen were mixed '*pusillus*' *s.l.* and '*parvulus*,' one was *obtusiventris* ♀ and four were *femoralis* (*notatulus* ♀). The eight *exaltatus* were all ♀♀, and the only two ♂♂ of this extremely common insect in his collection were placed in his series of *Pompilus gibbus*.

The other characters given for the species of the '*pusillus*' group by Haupt, as well as many of the minute and subtle differences by which he distinguishes other of our more difficult species of Psammocharidae, I am unable to follow in my British specimens. In this Magazine *ante* (1920, p. 34) I referred to the natural groups into which our very limited number of species of *Psammochares* divided.

In Haupt's Monograph the species as listed by Saunders under '*Pompilus*' are placed in two subfamilies, *Psammocharinae* and *Homonotinae* (*Planicepinae*), the latter including our two species *Aporus unicolor* and *Homonotus sanguinolentus*. Haupt has overlooked the British records of the latter, and gives its distribution as almost the whole of Europe *except* Britain.

The rest form two genera, *Episuron* with *rufipes* only in Britain, and *Psammochares* with a subgenus *Anoplius*, which contains our five species, *nigerrimus*, *concinnus* (*approximatus*), *piliventris* (*cardui*), *infuscatus* (*chalybeatus*) and *fuscus* (*viaticus*) and also *Evagetes* with one British species *dubius* (*bicolor*). The other species are divided into groups, to some of which are appended the names given by Ashmead, who considered them genera. Sooner or later it is probable that these names will come into general use. *Psammochares plumbeus* is the only British species, which is left in the genus in its most restricted form. *P. sericeus* and *cinctellus* are given to *Sericopompilus* Ashm., *campestris* (*pectinipes*) to *Sophropompilus* Ashm. The group of *spissus*, containing that species and *minutus* (*minutulus*) and the group of *gibbus* containing also *unguicularis*, *wesmaeli* and *consobrinus*,

* Since this was written I have found amongst some duplicates of *Priocnemis* a recent specimen of this species, captured in the New Forest, but without the name of the collector. Smith's specimen, though perfectly preserved, is about three quarters of a century old and is without any locality label.

have apparently neither received any special generic or subgeneric name. It will be seen that this classification is almost identical with the arrangement given in my paper above mentioned. There are many changes in the specific names, and Saunders' nomenclature of Aculeates even with such special changes as I suggested in this Magazine (1919, p. 8) is entirely out of date.

I have noticed in regard to British species two errors in Haupt's work. The British species we have called *P. pectinipes* is certainly not the species he figures under the name *crassicornis* Sh., nor is it likely that Shuckard's species was other than our very common and, so far as I know, only representative of this group, this, I have no doubt, being the species now referred to *campestris* Wesm. Haupt's *crassicornis* probably requires a new name. It is clear from Shuckard's statement that the Linnean specimens of '*pectinipes*' were quite different, as he saw the types. In referring to the antennal joints of his *crassicornis* as 'very short' Shuckard was no doubt comparing them with those of *gibbus*.

The 'approximatus Sm.' of my paper is wrongly referred to *nigerrimus*, the characters given in my table to separate these species being those used by Haupt himself, and I possess F. Smith's original specimens, or some of them.

Newton Abbott.
February, 1929.

THE TYPES OF THE HUMBLE-BEES DESCRIBED BY GRIBODO (HYMENOPTERA, BOMBIDAE).

BY O. W. RICHARDS, M.A., F.E.S.

With the kind help of Dr. J. Waterston of the British Museum, I have been able to get into touch with Doctor Masi of the Mus. Civico di Storia Naturale 'Giacomo Doria' at Genova. Doctor Masi has been so good as to send me the types of the species of humble-bees described by Gribodo in his two papers (1882, 1891). Unfortunately the type of *Psithyrus bellardii* Grib. (1891), one of the species I most wished to see, appears to be lost; it was described from two specimens, but neither can now be found.

1. *B. andamanus* Grib. (1882). This is a distinct species belonging to *Bombus* ss. (= *Terrestribombus* Vogt.)

2. *B. sycophanta* Grib. (1891). In the original description, Gribodo gives the locality as either Turkestan or Caucasus. I suspect that the specimen never had a locality label; at any rate the type is a female of *B. morrisoni* Cresson (1878), a species only

known in the United States. This synonomy solves the great difficulty hitherto met in identifying the species with any European or Asiatic form.

3. *B. volucelloides* Grib. (1891). The type agrees with the interpretation of Franklin (1913), and I have labelled a specimen (female) in the collection of the British Museum to indicate that it has been compared with the type.

4. *B. channicus* Grib. (1891). Described from a female and a worker, both of which I have examined. The species belongs to the subgenus *Alpigenobombus* Skor., and specimens exactly agreeing with the type are in the collection of the British Museum. One of these specimens I have labelled 'compared with type.'

5. *B. magrettii* Grib. (1891). Described from a series of workers and one male. The specimen, however, which I received as a male was really a worker. The species is identical with *B. montivagus* Smith (1878), of which the unique female type is in the collection of the British Museum. The mid metatarsus is spinosely produced, and the species probably belongs to the subgenus *Agrobombus* Vogt.

6. *B. simulus* Grib. (1891). Originally described from one worker captured in Sikkim, this species is only a slight colour variety of *B. dentatus* Handlirsch (1888), which has priority. It belongs to the subgenus *Alpigenobombus* Skorikov.

PAPERS QUOTED.

CRESSON, E. T., 1878. Descriptions of new species of North American bees, Proc. Acad. Sci. Philadelphia, p. 181-221.

FRANKLIN, H. J., 1913. The Bombidae of the new world, Trans. Amer. Ent. Soc., 39, p. 73-200, plates i-xxii

GRIBODO, G., 1882 Alcune nuove specie e nuovo genere di Imenotteri Aculeati, Ann. Mus. Civ. Genova, 18, p. 261-8.

GRIBODO, G., 1891. Contribuzioni imenotterologiche sopra alcune specie nuove o poco conosciente di Imenotteri Antofili, Bull. Soc. Ent Ital., 43, p. 103-119.

HANDLIRSCH, A., 1888. Die Hummelsammlung des k.k. naturhistorischen Hofmuseums, Ann. k.k. naturhist. Hofmus. Wien, III, p 209-250, 1 plate.

SMITH, F., 1878. List of Hymenoptera obtained by Mr. Ossian Limborg east of Moulmain, Tenasserim provinces, etc., J. Roy. Asiatic Soc. Bengal, xlvii, part II, p. 167-9.

Evreham Lodge, Iver, Bucks.
February 11th, 1929

ODONATA FROM THE SINAI PENINSULA, SUEZ AND PALESTINE, INCLUDING A NEW SPECIES OF *MESOGOMPHUS*.

BY KENNETH J. MORTON, F.E.S.

In view of the appearance of a fully illustrated and useful paper by Mr. Adolf Andres on 'the Dragonflies of Egypt' (Mem. de la Soc. Royale Ent. d'Egypte, 5 plates, Cairo, 1928), a copy of which the author has kindly sent to me, it is desirable to publish a short account of the *Odonata* collected by an expedition to the Sinai Peninsula and at Suez, forwarded to me by Dr. Bodenheimer, to whom I am much indebted for the opportunity of examining this interesting material. Owing to the exigencies of travel, the specimens were preserved with difficulty, and are mostly much broken. However, all of them could be determined. A species of *Mesogomphus* is included, which I have failed to identify with any of the regional species of the genus or with any of the African species with whose descriptions I have been able to compare it.

The following is a list of the species taken :—

Suez, 1.VII.
Ischnura senegalensis, 2 ♂♂.
Crocothemis erythraea, 5 ♂♂, 2 ♀♀.
Trithemis annulata, 4 ♂♂, 1 ♀.
Orthetrum farinosum, 1 ♀.
Brachythemis leucosticta, 1 ♂

Wadi Isle, 5.VII.
Trithemis arteriosa, 4 ♂♂, 2 ♀♀.
Mesogomphus n. sp., ♀.

Wadi Tarfa, 6.VII.
Sympetrum fonscolombei, ♂
Anax imperator, ♂.

Wadi Nasib, 7.VII.
Sympetrum fonscolombei, ♂, ♀.
Trithemis arteriosa, ♂.

Wadi Feiran, 12.VII.
Mesogomphus n. sp., ♂.
Crocothemis erythraea, 2 ♀♀.
Sympetrum fonscolombei, ♂, ♀.
Orthetrum chrysostigma, 4 ♂♂, 1 ♀.
Orthetrum anceps, 1 ♂, 2 ♀♀ (all teneral).

Mesogomphus sinaiticus, n. sp.

♂. Labium whitish, base of lateral lobes marked with ferruginous. Apical part of mandibles blackish piceous. Face whitish, shining, narrow trace of diffused brown on margin of labrum and anterior margin of post-clypeus; a broad pale-brown band covering most of anterior part of frons; frons above whitish; vertex with a blackish band across the ocelli encroaching slightly on the frons in the middle; basal joint of antennae pale; vertex behind the ocelli

pale, a brownish band separating it from the occipital plate, which is pale, slightly raised in the centre, the outer margin straight with fine pale cilia. Back of head mostly whitish, upper part brownish.

Prothorax mostly pale, transverse depression blackish.

Thorax heavily marked with dark brown or blackish stripes, the intervening pale parts greenish above, tending to bluish on the sides. Mesothoracic collar pale; dorsal carina narrowly pale, on either side the dark median stripes expand anteriorly and continuing more narrowly downwards meet the antehumeral slightly outward-curved stripes, which are also connected above, at the ante-alar sinus, with the median stripes, a lanceolate pale spot being thus enclosed Humeral stripes complete, broad, united below with a broad stripe on the first lateral suture. A broad stripe on second lateral suture connected inferiorly with a narrow one on the hind margin of metepimeron. Posterior part of sternum entirely pale.

Legs bluish-green marked with brown; anterior pair pale at base, femora mostly dark-brown above, tibiae lined with brown, tarsi brown. Other legs with brown coxae, otherwise very similar, the brown markings rather more extensive.

Abdomen slender; two basal segments slightly dilated, 3-7 cylindrical, 8-10 dilated in lateral and dorso-ventral dimensions; lateral margins of 8-9 foliate. Dorsum of 1-7 pale-greenish-yellow (with a slightly bluish tinge towards the ventral surface) marked with dark brown or blackish; segment 1 dark on more than one half of dorsum, the dark colour extending to the entire length of segment laterally on the upper part, the lower half pale. Segment 2, dorsum brownish, with a median lanceolate pale spot the whole length of the segment; brown half-way down sides, with three narrow brownish projections (the median one shortest) on the pale lower portion, the auricles entirely pale. On segments 3-6 a mid-dorsal dark-brown narrow spindle-shaped marking crossed in its middle by the dark transverse carina; apical third of these segments dark (somewhat suffused and ferruginous anteriorly), the dark colour extending at the extreme apex as far as the ventral carina and joining a broad latero-ventral stripe running to the transverse carina where it is broadest, this stripe on 3-4 extending slightly beyond that carina. Segment 7 similar to 5-6, excepting the mid-dorsal spindle-shaped marking, which is absent. Terminal segments yellowish on dorsum, partially suffused with ferruginous, on the sides passing into brown and lower down again becoming more yellowish; foliaceous expansions of 8-9 ferruginous without dark margin. Connecting membranes at apex of segments 7-9 yellow, with a black thickening low down on the sides.

Appendages ferruginous: viewed from above they are narrow parallel, their inner upper margin shallowly concave in their basal half; from the side they are curved downwards and slightly inwards, the apex blunt and bearing on either side a very short, blunt, black tooth or spine (it is neither split, as represented by Hagen's figure of *O. genei* (Mon. pl. 3, fig. 4c), nor truncate and slightly excised, as in McLachlan's note on that species (E.M.M., Vol. xxxiii, 1897)). Inferior appendage, viewed from side, strongly curved in its basal half, the outer half nearly straight and blunt at the apex, with a very short ante-apical black spine; about the middle there is a black scabrous patch on the lateral margins.

Wings hyaline, scarcely tinged; costa light-yellowish to the pterostigma, venation blackish, cross veinlets in anterior spaces proximal to nodus pale. Pterostigma ochraceous between strong black nervures, covering 3½-4 cells. Ante-nodals, forewing 10-11, hindwing 7-8; post-nodals, forewing 8-7, hindwing 7-7. Length of abdomen (cum apps.) 39; hindwing 29; pterostigma 3 (fully) mm.

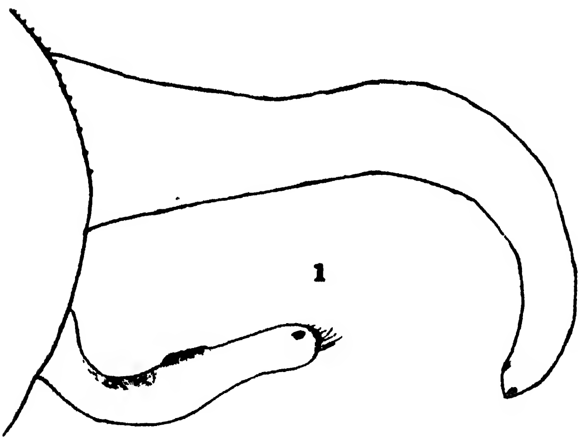
♀. Head crushed. Prothorax and thorax very similar to the ♂. Legs with the darker colour reduced, the markings on femora of 2nd and 3rd pairs only about one-third of their length.

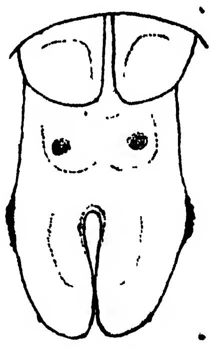
Abdomen: Segment 1 damaged; dorsum of 2 with a pale elongate marking like that of the ♂; on 3-6 the mid-dorsal spindle-shaped markings are less distinct, the apical band narrow, preceded by two dark spots, the space between the band and the spots on either side of dorsal carina ferruginous (the reduction of the dark colour here in comparison with the ♂ very likely due to the less advanced age of the ♀); segment 7 with a brown triangle based on distal margin and reaching transverse carina; dark latero-ventral line on segments 2-7 with rather shorter interruptions than in the ♂. Segments 8-10 with scarcely dilated margins, dorsum pale excepting posterior half of 8 and posterior fourth of 9, which are dark brown; lower parts pale, but indications of suffused darker latero-dorsal lines on 9-10; connecting membranes as in ♂. Appendages longer than segment 10, very slender and acute ferruginous. Vulvar scale large (fig. 4), with a square excision on distal margin and a shallow median channel; ridge bounding the area on segment 9 occupied by vulvar scale, thick laterally and reduced in middle.

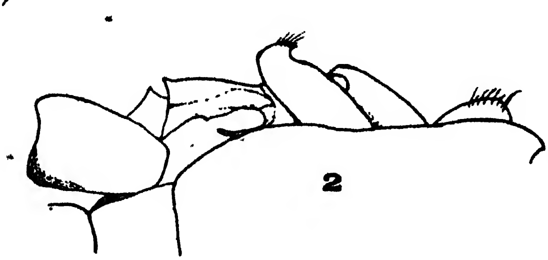
Ante-nodals in forewings 11-12; post-nodals 6-6; in hind wings, ante-nodals 9-9, post-nodals ?-7.

Length of abdomen about 36; hindwing 31; pterostigma 3 25 mm.

♂, Wadi Fieran, 12.vii; ♀, Wadi Isle, 5.vii.







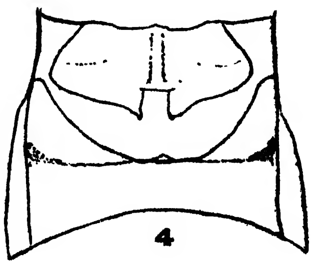


FIG. 1. Appendages of ♂ from side.
,, 2. Genitalia of 2nd abdominal segment from side.
,, 3. Inferior appendage from beneath.
,, 4. Ninth ventral segment of ♀, with vulvar scale

Although no fresh additions to the Odonata of Palestine fall to be recorded, some further information regarding their distribution has been obtained. The details given below are additions to those published in Trans. Ent. Soc. Lond., 1924, pp. 25-44. The relative specimens were received from Dr. Bodenheimer, but I understand some of them were taken by Mr. Theodor.

Ben Shemen, near Lydda: *Sympetrum fonscolombei* ♀, much damaged, at light-trap, 6 October, 1926.

Huleh: *Orthetrum anceps* and *Platycnemis latipes dealbata,* July, 1923.

Chedera (Khedeira): *Lestes barbarus, Ischnura elegans, P. latipes dealbata, S. fonscolombei* and *Crocothemis erythraea,* 17 June, 1926.

Gisr el Ghoranije (Jordan, near Jericho): *S. fonscolombei, Pseudagrion* sp., 12 September, 1926; *Trithemis annulata* and *Orthetrum chrysostigma* ♂ (sub-juv.), 28 October, 1926.

Another specimen of *Caliaeschna microstigma* has been received from the same source as that referred to in the above mentioned paper, p. 40. This second specimen bears a definite locality label, 'Rehoboth.' The extension of the range of this species to Idumea is interesting. Dr. Bodenheimer tells me that near Rehoboth there is a small perennial stream with large and thick reed-grasses, no doubt the haunt of such dragon-flies as occur there.

An item regarding *Anax parthenope* may be referred to here. When Mr. J. Omer-Cooper and Dr. Hugh-Scott were on their way to Abyssinia in August, 1926, this species was taken aboard ship at electric light, a ♂ in Suez Canal on 24th and a ♀ on 28th in the Southern part of the Red Sea. Dr. Scott suggests that the second specimen may have come on board some days previously either in the Canal or Gulf of Suez.

The *Pseudagrion* mentioned above is the species which I have already recorded from Palestine as *P. acaciae*. Dr. Ris has since sent me specimens of *P. acaciae* from Egypt, which he considers to be the true *acaciae* of Förster. Although allied to the Palestine species, they are not the same. As Ris is at present engaged in a revision of the African species of the genus, I await his final conclusions on the matter.

13 Blackford Road, Edinburgh.
30th January, 1929.

Is Orchestes angustifrons Wat. a British species?—Mr. Donisthorpe has reminded me that in Ent. Mo. Mag. 1925, p. 14, Col. Deville records the occurrence of this species in the British Isles. This was after examination of a doubtful specimen of *O. saliceti* F. sent to him by me, and given to me by Canon Fowler, without locality or any further data on it. I did not regard this single specimen as sufficient to justify its introduction as a British species, but I ought long ago to have recorded the above facts, and to have enquired as to whether any specimens were in other British collections.

The distinguishing characters between the two species are :—

Funiculus 7-jointed, *foliorum* Mull. (*saliceti* Payk.).

Funiculus 6-jointed, *angustifrons* Wat.

My specimens of *O. foliorum* have all the femora black; *angustifrons* has the front and middle part yellow. I do not know whether this character is constant. Reitter does not include *angustifrons*.—NORMAN H. JOY, 78 Crescent Road, Reading: *January 30th*, 1929.

Cetonia floricola Herbst in the New Forest.—I shall be interested to know whether any Coleopterist has seen or taken *Cetonia floricola* Hbst. in Hants or elsewhere in S. England. Two examples of this northern insect (now in the Notts Mus. Coll.) were taken at Rhinefield, in the New Forest, by my wife on June 6th and June 15th, 1923, respectively. The first of these was discovered quite accidentally, and forwarded on to me at Nottingham alive, under the impression that it was only a somewhat obscurely-coloured *C. aurata* L. (living examples of which I happened then to be in need of); but the second capture, made about a week later, was the result of several hours' close search of the original locality—an ordinary enclosure drive. Both specimens were found crawling amongst grass in the vicinity of nests of *Formica rufa* L. Curiously enough, *C. aurata* was not seen in this part of the forest, which, however, my wife was only able to work at the time on the two occasions mentioned.—H. P. JONES, Nat. Hist. Museum, Wollaton Hall, Nottingham.

Ceuthorrhynchidius pulvinatus Gyll.—Although the British status of this species is accepted by Fowler (Col. British Islands, Vol. V, p. 362), it is one of those marked with a † in the catalogue of Newbery & Sharp. It therefore seems worth recording that specimens obtained from time to time in Suffolk, and provisionally determined as *C. pulvinatus*, were recently submitted to Col. Sainte-Claire Deville, who has kindly confirmed their identification. Specimens were also compared with the single one in the Power Collection in the Natural History Museum, and were found to agree with it except as regards size—Power's specimen being very noticeably larger. Possibly the reason why *C. pulvinatus* is little known to British Coleopterists is that its foodplant is *Sisymbrium Sophia*, a species which is very local in Britain and occurs most freely in the 'breck' sand districts of East Anglia. In this area and on this particular plant the weevil has been found freely, sometimes in great abundance; it has not only been taken on the true 'breck' sands, but also on the Suffolk coast at Walberswyck, where a patch of the *Sisymbrium* grows on the village rubbish dump, and at Cromer in Norfolk, but in this latter case the foodplant was not determined. Fowler, on the authority of Blatch, also records the insect from Hunstanton and Evesham, this second locality rather suggesting that the beetle may also live, although rarely, upon the common *Sisymbrium officinale*.—J. C. F. FRYER, Harpenden: *February 9th*, 1929.

Ceuthorrhynchus rapae Gyll. and Psylliodes cyanoptera Ill.—In addition to the *C. pulvinatus* mentioned in the previous note, both *C. rapae* and *P. cyanoptera* occur, sometimes not uncommonly, on *Sisymbrium Sophia* in the 'breck' sand districts of Suffolk. An attempt to find the larvae of the *Psylliodes* failed, but the stems of the *Sisymbrium* were found to be tenanted by numerous weevil larvae which appeared to belong to two species—a smaller one (possibly *C. pulvinatus*) living in the upper part of the stem and a larger one in the lower part and almost in the root. An attempt to rear these larvae to maturity was very unsuccessful, but one individual—probably one of the larger larvae—ultimately emerged as *C. rapae*. It is evident, therefore, that the species lives upon *S. Sophia* both in the adult and larval stages, and that this plant is perhaps better suited to it than *S. officinale*, from which it is usually, though not commonly, obtained.—J. C. F. Fryer : *February 19th*, 1929.

The Food-plant of Ceuthorrhynchus angulosus Bohem.—Although this weevil has been taken regularly in the Chatteris neighbourhood for a period of nearly twenty years, it has usually been obtained by general sweeping, and until recently its food-plant has remained a mystery. Odd specimens have been detected on various labiate plants, including *Mentha* sp., *Lycopus europaeus* and *Galeopsis* sp., but there has been little to indicate any definite attachment to any one of them. In June, 1927, however, it was noted that the leaves of *Stachys sylvatica* in a hedgerow near Chatteris had been extensively attacked by weevils, which on further examination proved to be *C. pollinarius* and *C. angulosus*, the latter insect occurring in greater numbers than had previously been noted in any one place. A pair brought back to Harpenden fed freely on *Stachys sylvatica*, and although the male died in the course of two or three weeks, the female was still alive in the spring of 1928 and so lived at least ten months, although she had no progeny. It was evident then that the adult *C. angulosus* was able to thrive upon *Stachys sylvatica*, an observation which is in conformity with a statement of Hustache quoted by Col. Sainte-Claire Deville (Faune des Coléoptères du Bassin de la Seine, Vol. VI bis, Supplément, p. 92). It was equally clear, however, that *S. sylvatica* is not the normal food-plant of the weevil near Chatteris, since the insect is definitely attached to the fields and dyke sides of the cultivated fenland where the *Stachys* is not found. Attention therefore was again directed to the fenland labiates, and especially to *Galeopsis*, owing to the fact that from time to time weevil larvae of about the right size for *C. angulosus* had been found in the stems of plants of this genus. This final search was successful, and in June, 1928, specimens were obtained freely on *Galeopsis* (chiefly, it is believed, upon *G. speciosa*)—holes in the leaves showing clearly which plants had been attacked. Probably the failure to make this discovery earlier was due to the fact that the *Galeopsis* had not previously been searched at the right time of year. It is suggested that Coleopterists in need of *C. angulosus* should turn their attention in June to *Galeopsis*, and specially to *G. speciosa* or *tetrahit*, growing on cultivated land in low-lying localities.—J. C. F. Fryer : *February 20th*, 1929.

Hymenoptera Anthophila, Andrena: by J. Van der Vecht.—I have recently received a new work on the species of *Andrena* found in Holland by Mr. J. Van der Vecht. It forms part of the 'Fauna van Nederland,' Aflevering IV, published by A. W. Sijthoff, Leiden, 1928, and is of great interest to students of British bees. It consists largely of a very full table for distinguishing all the Dutch species, including also all that are known as British, even those not yet found in Holland, and a number of Continental species likely to be found in

that country, though they have not yet occurred there. The following twelve species are found in Holland but unknown in Britain, where there is a possibility that one or two of the might occur: *A. morawitzi* Th., *agilissima* Scop., *fulvida* Sch., *mitis* Schmied., *ventralis* Imh., *labiata* Sch., *curvungula* Th., *combinata* Chr., *propinqua* Sch., *bremensis* Alfk., *chrysopyga* Sch., and *gebriae* V. d. Vecht.

The following eight British species are not yet known from Holland: *A. trimmerana* K. nec. Auct. (*spinigera* K.), *bucephala* St., *ferox* Sm., *polita* Sm., *nana* K., *congruens* Schm., *simillima* Sm., *tridentata* K.

Some species widely spread and abundant, though local, with us, e.g. *A. helvola, synadelpha* and *dorsata*, are at present known by very few specimens in Holland, where they have probably been overlooked; and I should think that the list of that country will go still further ahead of ours, largely as the result of Van der Vecht's work, which should be in the hands of all our students of British *Andrena*.—R. C. L. PERKINS, 4 Thurlestone Road, Newton Abbot: *February 12th*, 1929.

Aculeata Hymenoptera, etc., in S. Hants, June 1928.—The following few Aculeates were discovered amongst other species on the cliffs at Milford, Hants, during a short stay in the vicinity from June 2nd to 15th, 1928. About the same time I spent several odd days in the New Forest, but observed there nothing of note except a solitary ♀ of *Halictus prasinus* Sm.—worn, and of the type that lacks the metallic green tint on the pronotum. This local insect has been somewhat scarce of recent years in its special localities in the Forest. So far as my own experience is concerned, it does not appear to frequent the coast. Among the bees, *Andrena fulvago* Chr. was abundant, the males more or less faded, but most of the females in almost perfect condition. *A. cingulata* F., ♀♀, not uncommon on paths almost on the beach. *Halictus minutissimus* K. and *H. breviceps* S. by far the most frequently met with of the more local *Halicti*. Both these minute bees, together with *H. nitidiusculus* K., *H. villosulus* K. and *H. morio* F., abounded on yellow wallflowers in my father's garden at Lymington on June 1st, where a pleasant sight was the comparative abundance of migrant butterflies, chiefly of course 'Painted Ladies,' but with a fair sprinkling of 'Red Admirals' and 'Clouded Yellows' (*Colias croceus*). *Sphecodes rubicundus* v. Hag., ♂♂, ♀♀, common on a sandbank in company with *Andrena labialis* K. and *A. nigroaenea* K. *Osmia xanthomelana* K., worn ♂♂, and one ♀ in scarcely better condition. This is, I believe, the first record of the occurrence of this fine *Osmia* on the mainland of Hants. *Bombus sylvarum* L.: A nest in a sandbank close to the sea.

Of the wasps, *Eumenes coarctata* L. ♂♂ were just appearing, and a perfect ♂ example of *Oplomerus* (*Odynerus*) *melanocephalus* Gm. was taken.—HUGH P. JONES, Natural History Museum, Wollaton Hall, Nottingham: *February 1st*, 1929.

Phobocampa confusa Thoms. in Ireland.—My attention was first drawn to this Ichneumonid by Mr. A. M. Gwynn, who in July, 1925, brought me several cocoons of *Phobocampa* spun by larvae bred at the expense of *Vanessa urticae*, collected at St. Columba's College, Co. Dublin. From one of these cocoons there emerged on 9th August, 1925, a hyperparasite—a ♂ *Hemiteles* not yet identified, and on 23rd April and 1st May, 1926, a ♂ and ♀ respectively of *Phobocampa confusa* Thoms.

In July, 1926, in the Devil's Glen, Co. Wicklow, I discovered a bed of nettles whose leaves had been eaten by a colony of larvae of *Vanessa io*, which were about to pupate. Hanging to the stems of the nettles I also found many

Phobocampa cocoons, some of the normal brown colour and some glistening white. The latter proved to be but freshly spun, and in less than an hour had assumed the brown colour. From these the first *Phobocampa confusa*—a ♂—emerged on 28th March, 1927, a ♂ and a ♀ on 18th April, and another ♀ on 29th April following. On 6th May an interesting hyperparasite emerged in the form of a ♀ *Pimpla clavicornis* Thoms.

Mr. Gwynn also brought me some *Phobocampa* cocoons in July, 1926, bred from *V. urticae*, from which, between the 3rd and 7th of the following month I bred four ♀♀ of another hyperparasite *Gelis* (=*Pezomachus*) *instabilis* Först.

I have to thank Dr. A. Roman for identifying the *Gelis instabilis* and for confirming my identification of the other species mentioned.—A. W. STELFOX, National Museum, Dublin: *January 29th*, 1929.

Lissonota maculata Brischke in Ireland.—When sorting out the Ichneumonidae captured during the season 1924, I discovered, amongst numerous females of the common *Lissonota bellator*, a single ♀ belonging to a closely-allied species which would fit nothing described in Morley's 'British Ichneumonidae.' This specimen had been captured on 6th July, 1924, at Raheny, Co. Dublin, by Mr Eugene O'Mahony. The only species mentioned in Schmiedeknecht's 'Opuscula' to which my specimen might possibly have been referred was Brischke's *L. maculata*; but I rejected this as the central abdominal segments of the abdomen were described as square, whereas in mine these were distinctly longer than broad. Its identity was therefore left undetermined until 1926.

As this latter season produced quite a crop of ♀♀, similar to the one referred to above, I sent one to Dr. Roman, who replied that it belonged to a species unknown to him, but was probably *L. maculata*; and, knowing that this species had recently been added to the British list by Mr. L. A. Carr, of Lichfield,* I was able to borrow one of his specimens—which had been identified by Schmiedeknecht—from the Manchester Museum and to satisfy myself that Dr. Roman's surmise was correct. I have to thank the Keeper of the Manchester Museum (Dr. G. H. Carpenter) and Mr. H. Britten for their courtesy in allowing me to examine a ♀ named by Schmiedekneckt.

In general appearance the ♀ *maculata* differs from that of *bellator* in having a more slender abdomen and longer terebra, yellow triangular marks on the mesonotum and black antennae—not pale at the joints when looked at against the light as in the case of *bellator*. Moreover, while the basal segment of *maculata* has a shallow central dorsal depression, extending from the base almost to the apex, that of *bellator* is slightly convex; also the first three segments of *maculata* are strongly and scabrously punctured, and the second, third and fourth segments have each a pair of black spots—those on the second segment usually uniting to form a transverse band—and the red parts of the abdomen are a deeper colour and not so orange-red as in bellator. In habits and time of appearance the two species also differ, all of the twenty-three ♀♀ of *maculata* which I have taken or examined having been captured on or about rotting timber (logs or stumps), and none have ever been seen on flowers; while the ♀♀ of *bellator* are most often captured on what Morley terms the 'flower-tables' of Umbelliferous plants, such as *Angelica*. And, whereas *bellator* is rare before the middle of July—my earliest date for it is 1st July—and its season extendes well into September, my dates for *maculata* are June 4th, 7th, 10th (6), 12th, 13th, 14th (2), 15th, 17th, 20th, 25th, July 1st, 3rd, 6th, 8th (2), 9th and 11th.

* 'Transactions,' N. Staffs Field Club.

Finally, whereas the ♂♂ of *bellator* are very numerous and outnumber the ♀♀, I have only on one occasion captured a ♂, of this group, on the same day and in the same place as the ♀ of *maculata*, and have no reason to think that this single ♂ is anything but *bellator*. Schmiedeknecht does not describe the ♂ of *maculata* in detail—and he omits the ♂ altogether in his table—but he states that it is very like that of *bellator*, a statement which I find difficult to understand when examining the ♀♀ of the two species side by side. While the ♂♂ which I have allotted to *bellator* are, I must admit, very variable in colour, there is not one which I would suspect was a ♂ of *maculata*, and the dates upon which the vast majority of them were taken are later than my last date for the ♀ of *maculata*. Besides five ♀♀ captured by Mr. O'Mahony in the neighbourhood of Raheny, which is just north of Dublin city, I have one from near Lahinch, Co. Clare, and seventeen, taken by myself, in various places in Co. Wicklow between Powerscourt and Arklow.—A. W. Stelfox, National Museum, Dublin: *February 9th*, 1929.

Society

Entomological Society of London: *Wednesday, December 5th*, 1928.—Mr J. E. Collin, President, in the Chair.

The Secretary read the nominations of the Council for Officers and Council for 1929-30, for the second time.

The following were elected Fellows of the Society:—W. R. Thompson, Ph.D., D.Sc., Farnham House Laboratory, Farnham Royal, Bucks; J. F. Perkins, 4 Thurlestone Road, Newton Abbot, Devon; F. J. Reed, Eastover, Bridgwater; K. R. Karandikar, B.A., M.Sc, Department of Entomology, University of Edinburgh.

Dr. R. Stewart MacDougall exhibited (1) *Niptus hololeucus* breeding in unusual habitats. (2) A nest of *Bombus lapidarius* parasitised by *Psithyrus rupestris*. (3) An example of *Sirex gigas* boring in chocolate. Dr. K. Jordan exhibited and made remarks on some rare Indian Sphingidae. Mr. O. W. Richards discussed the habits of the Anthicid, *Notoxus monocerus* L. Mr. E B. Ashby exhibited insects of various orders from the French Riviera. Mr W. J. Kaye, forms of *Terias proterpia* from Costa Rica. Professor E. B. Poulton made the following communications:—(1) Notes on the courtship of *Hypolimnas misippus* L. and on the migration of Pierine butterflies in Uganda by Captain C. R. S. Pitman. (2) Insects taken on a ship hundreds of miles from land, by Dr. W. C. C. Pakes. (3) The different female forms of *Cymothoe caenis* Drury in the Belgian Congo and Uganda. (4) Danaine and Acraeine butterflies eaten by birds at Amani, Tanganyika Territory. (5) Further notes on the abundance of *Tinea uterella* Wlsm. in Uganda, by Captain C. R. S. Pitman. (6) The strange behaviour of certain birds when in possession of strong smelling insects. Mr. W J. Kaye showed a number of lantern slides to illustrate a collecting expedition in Costa Rica.

The following papers were read:—(1) 'Acrididae collected in Tanganyika Territory,' by Mr. N. C. E. Miller; (2) 'Collembola from Abyssinia,' by Dr. E. Handschin; (3) 'Scent Organs of *Opsiphanes cassiae lucullus* Fruhst. (Lep Brassolidae), by Dr. H. Eltringham; (4) 'Taxonomy, Phylogeny and Distribution of New Zealand Cicadas,' by Dr J. G. Myers; (5) 'On the repugnatorial glands of *Corixa*,' by Mrs. H. H. Brindley; (6) 'On Oxyhaemaglobin in *Macrocorixa geoffroyi*,' by Mrs. H. H. Brindley, who illustrated her remarks with lantern slides.—S. A. Neave, *Hon. Sec.*

AN ENTOMOLOGICAL TOUR IN KURDISTAN.

BY HUGH SCOTT, M.A., SC.D.

(PLATES III, IV, V.)

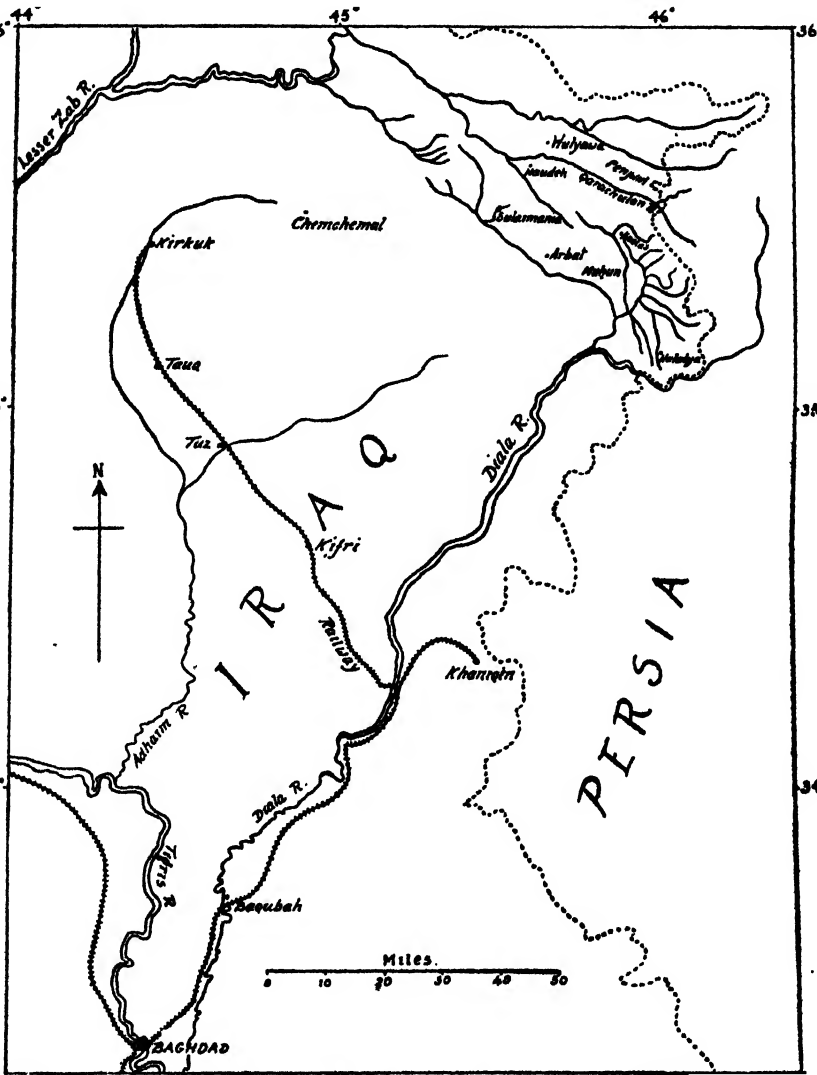
During my recent short tenure of the position of Agricultural Entomologist to the Government of Iraq it fell to my lot to undertake a tour of inspection in the mountainous country of Kurdistan. Official journeys in various parts of Iraq would have recurred not infrequently in the course of my duties, had I continued to hold the post. As things happened, this single tour was an exceptionally intriguing experience to me, and the story of it may be of some general interest, if only to indicate the kind of problems to be grappled with. I have submitted a report on matters of economic importance to the Iraq Department of Agriculture, and my observations on subjects relating to entomology, both 'economic' and 'uneconomic,' are here narrated in a different form.

Kurdistan is a large term, and the regions inhabited by the Kurds embrace parts of Persia and Turkey as well as of Iraq. I saw only a piece, even of that section which lies within the Kingdom of Iraq. My operations were confined to the Liwa (administrative division) of Sulaimania, with its capital, the town of that name, as a base; but they led me to within a mile or two of the Persian frontier, nearly 180 miles N.N.E. of Baghdad as the crow flies, while by the route I followed the distance from Baghdad to my furthest point was more than 300 miles. The whole district is visited by comparatively few Britishers, and probably little or nothing has been written about its entomology in British journals.

The tour lasted just over a week, June 21st-29th, 1928. Could I have carried it through a month earlier, which was impossible, the season would have been more favourable for investigations into the status of certain pests, and Kurdistan would have been a garden of wild flowers. In those torrid regions late summer was in full swing by the end of June. Most wild plants had gone to seed, insects were relatively scarce, and not a butterfly was seen during the whole tour. But much of interest remained on view.

A 200-mile rail journey brought me from Baghdad to the ancient city of Kirkuk. It lasted eighteen hours and was hot, the temperature in the compartment reaching 111 deg. F. in the middle hours of the day, despite an electric fan and other cooling appliances. Little but sun-baked, dun-coloured plains met the eye. Large parts are under cereal cultivation, and towards the

end of the journey the last of the newly reaped grain-harvest was seen being carried on donkeys. Though the land appears level there is actually a rise of about a thousand feet or more from Baghdad, since Kirkuk lies at an elevation of 1,100 feet above the sea.



SKETCH MAP OF IRAQ, ETC.

" On June 23rd I travelled a further 74 miles, nearly due East, between Kirkuk and Sulaimania in a hired Ford car, over a route which is being converted from a rough track into a motor-road. The driver was an Assyrian Christian, and my laboratory-boy, who accompanied me throughout the tour, belonged to the same ancient

nation and Church. On leaving Kirkuk there is a sudden change in the country-side, the traveller finds himself almost immediately among the foothills and, further on, in the region of Chemchemal, two mountain ridges and a broad valley are crossed. There is a total rise of about 1,600 feet from Kirkuk to Sulaimania, which lies at an altitude of approximately 2,700 feet. The hills are grass-covered and for the most part treeless, though the slopes of one defile were dotted with scrubby bushes of evergreen oak. A brief halt was made in the foothills at a point where a few spikes of wild white hollyhock (*Althaea*) were still in flower, and a Clerid beetle (*Trichodes laminatus* Chevr., var.) was taken from the large globular blue flower-head of a globe-thistle (*Echinops*). At another stopping-place, higher up and near a stream, the herbage was full of an umbelliferous plant (*Eryngium* sp., related to the sea-holly) and of spiny, thistle-like Compositae, some with yellow, some with mauve, flowers, while grasshoppers abounded. There was no lack of insectivorous birds. Swallows perched in flocks on the telegraph-wires, swifts circled over the villages and flocks of rose-coloured starlings (*Pastor roseus*) were seen. The last are of special interest to entomologists, as they feed largely on locusts.

The town of Sulaimania is pleasantly situated in a broad, undulating valley and is backed by a long range of grassy mountains, the Girjeh Range or Asamir Dagh, rising to over 5,000 feet. Its day temperature in summer is often ten to twenty degrees (Fahrenheit) below that of Baghdad, and the relief felt by one newly arrived from the plains is very great. It is, however, subject to a hot and exhausting north-easterly wind called *Rashaba*, which blew during part of my stay. At this place one is surrounded by a different style of building, a completely different race and language from those of the Arab-populated plains. The dress and customs of the Kurds are among the most picturesque and interesting that I have ever encountered, but they cannot be enlarged on here. I found shelter in the guest-rooms of the Sarai, a large unfinished new Government building, and was most hospitably entertained at the house of the Administrative Inspector, Captain W. Lyon, O.B.E., and Mrs. Lyon.

In the afternoon I was taken to see a beet-crop which was heavily infested with flea-beetles (Halticinae), the cause of serious damage to the foliage. Specimens examined by Herr Heikertinger prove to belong to three species, *Phyllotreta cruciferae* Goeze and *Chaetocnema tibialis* Illiger, both present in great numbers, and a species of *Haltica*, probably *H. tamaricis* Schr., which seemed much scarcer. So far it has only been possible to

recommend the use of a well-known mechanical contrivance for controlling these pests.

Not far away was a field of wheat, left unharvested as worthless owing to the depredations of the Pentatomid (Scutellerine) bug *Eurygaster integriceps*. This is known as the *Sunn* pest of cereals, or *Ergaija* (possibly a corruption of the word *Eurygaster*) and is one of the worst insect pests in Iraq, Syria and parts of Persia and Russia. It occurs all over Iraq from the Northern and Eastern frontier-hills to the plains as far South as Baghdad. South of that latitude cereals are harvested before the nymphs reach maturity, and the consequent enormous mortality prevents the damage from assuming serious dimensions. North of Baghdad the adults appear on the young crops in early spring, apparently by migrating from the hills. They lay eggs in late March and April on the undersides of the leaves of weeds or of the young cereals. The adults at first feed by sucking the main stem and later attack the immature grain. The new-hatched nymphs also feed on the main stem and, as they develop, climb the plants and suck the grain. The attack on the stem produces tillering, and that on the ears renders the grain worthless. A badly infested field may produce no grain at all, or at most only about half the normal amount. By the latter part of May most of the nymphs have become adults. Barley-harvest is then mostly over and wheat-harvest soon follows.

What happens to the adults from that time till the next spring is not fully understood. Some, but apparently only a small proportion, aestivate in the plains. I found them near Baghdad early in June under dry clods at the roots of fig trees, or several inches deep in the soil. But specimens reared in captivity evince a marked desire to take flight a few days after becoming adult, others have been seen flying strongly in the open, and the accepted idea is that most of them migrate to the North. In Persia they spend the rest of the summer and the following winter hiding at the roots of scrub on mountain-sides. Near Tehran and other cities there are well-known spots where they congregate in thousands, and are collected and destroyed by forced labour. There is a striking analogy between this congregating habit and that of various COCCINELLIDAE in Europe, which mass together in great numbers in the winter months, sometimes in very exposed situations.*

* Much of the above information about *Eurygaster integriceps* is taken from two publications of the Department of Agriculture, Iraq: J. F. Webster, 'Sunn Pest on Cereals in Iraq' (*Agricultural Leaflet* No. 13, 1926) and R. S. Y. Ramachandra Rao, 'A Preliminary List of Insect Pests of Iraq' *Memoir* No. 7, pp. 8, 9, 1921). As regards the congregating habits in Persia, I had consulted the files of correspondence received by the Department of Agriculture from American Agriculturists employed by the Persian Government.

At Sulaimania I was much too late to see anything of the pest at work on the wheat. Moreover, its incidence in 1928 as compared with previous seasons had not been severe. The attacks seem to be worst in particular cycles of seasons, which possibly recur with a rhythmic periodicity. No adults could be found near the unreaped wheat, though we searched under stones and clods, and at the roots of big weeds and maize-plants. The cultivators said all the adults had flown away 'to Iran' (Persia), but afterwards admitted that they had found some on the mountains near by, even in winter, in pits dug for storing snow through the summer. Two days later, at Penjwin, I found a few specimens under dead leaves at the roots of scrub-oak, in spite of the positive assurance of the cultivators that I should discover none. But in this short tour I could not find any spot where massed hibernation takes place. It seems improbable that *all* the adults from so vast a region fly to the known localities in Persia; probably there are other congregating-places in the mountains of Iraq, which it would be worth while to bring to light, in order to collect and destroy the resting adults.

* * * * * *

I must leave this devastating pest and go on with my journey. The Administrative Inspector arranged for me a four-days' trek through the heart of the country. I was to make a circuit, viâ Kaolas to the little town of Penjwin, almost on the frontier of Persia, and returning more to the North by way of Wulyawa. Kaolas and Wulyawa are small mountain-villages. Captain Lyon also sent with me a Kurdish Government interpreter, Mohammed Rashid Effendi, a very helpful and informative companion.

Accordingly on June 24th I left Sulaimania before 6 a.m. on a 58-mile journey to Penjwin. Forty-two miles, to Kaolas, were accomplished in the Ford car, though the latter part was over fairly rough tracks; the remaining 16 miles, Kaolas to Penjwin, on horseback, a vastly preferable means of travel in such country. We set off South-Eastwards along the broad valley surrounded by mountains. The scenery is diversified by numerous large artificial hillocks, situated in the valley usually close to villages. They are relics of some long-vanished culture and are generally surmounted by the erections of the most recent civilisation of all, namely police block-houses built within the last few years, since the Government of Iraq took over the permanent administration of this rather turbulent region. Later, we worked East, and then North to Kaolas.

A point where a car could go no further was reached, on a nearly flat valley-floor hemmed in by high and lonely mountains. The little, low, flat-topped houses of Kaolas village harmonised so much in colour with the steep mountain-side on which they were perched, as to be hardly noticeable in the mid-day glare. But part at least of the population was dwelling temporarily in summer-booths constructed of boughs and matting (Pl. V, fig. 5) in the valley close to some plantations of tobacco. At the moment of my arrival this crop was being attacked by a flying swarm of locusts (*Schistocerca gregaria*) and the few inhabitants were walking up and down the rows, crying out and beating on metal dishes, to drive off the invaders. There were no other cultures in sight, but even had there been, these cultivators would probably have been quite content to chase the locusts off their own plantations, without reckoning the chance of driving them on to other people's. One of the difficulties of the authorities in combating locusts and other pests is to induce or enforce, not merely better methods, but co-operation between those who cultivate the land.

Schistocerca gregaria is often called 'Nejdi locust' in Iraq, as its immigrations come from Arabia. Very serious invasions took place early in 1928 in Iraq and the adjacent countries, and the locust-control section of the Agriculture Department had its hands full. In the Kurdish mountains on June 24th I saw the swarm just mentioned, and on June 27th I again passed through a flying swarm in a wild, uncultivated valley called Dukanian valley, on the far side of the long range that rises behind Sulaimania. These swarms were very dense, but probably only about a mile in extent, so they were very small compared with the huge swarms occurring in the plains. I collected twenty-two examples from the mountain-swarms, and Dr. Uvarov tells me that, though they were swarming, they are not quite typical of the swarming phase, but in small details of colour and structure are to some extent intermediate between it and the solitary phase. On June 27th, at Wulyawa, altitude about 4,000 feet, I saw 'hoppers' of this species in an advanced stage (probably 4th) of development, eating the tough leathery leaves of the evergreen-oak scrub, leaving only a few veins of each leaf in the boughs attacked. The parents of these hoppers were doubtless some of the winged immigrants which invaded Kurdistan earlier in the season. My colleague, Mr. Dutt, afterwards told me that some of the swarms in Southern Iraq were laying eggs early in March, while in the hill-country north of Erbil (North-West of Sulai-

mania) egg-laying was proceeding early in May. The inference is that a summer generation develops (or possibly two develop) in Iraq from eggs laid by the spring immigrants : but that extremes of summer heat and winter cold prevent the species becoming permanently established.

While on the subject of grasshoppers I may add a list of the few species collected between Sulaimania and Penjwin, at altitudes varying between about 2,700 and 4,500 feet. Besides the *Schistocerca,* the following ACRIDIDAE : *Dociostaurus maroccanus* Thunb., *D. genei* Ocsk., *D. anatolicus* Kr., *D. sp. indet., Oedipoda miniata* Pall., *Acridella robusta* Uv., *Paranocarodes* sp. Also the following TETTIGONIIDAE : *Medecticus assimilis* F.-W., *Pholidoptera zebra* Uv., *Saga ephippigera* F.-W.

Schistocerca gregaria and *Dociostaurus maroccanus* are the two important swarming and migratory locusts of Iraq. While the former invades the country from the South, the latter belongs to the hilly Northern and North-Eastern borderlands. It is a small grasshopper, the immature 'hoppers' of which sometimes form great swarms; but the examples taken on this tour, which were mature and found at Kaolas, were not swarming. The *Paranocarodes* is a wingless insect in which the male is only about half the length and one-quarter the bulk of the female, and is probably a new species of the genus. *Saga ephippigera* is a giant flightless insect, in which the male has vestigial tegmina and no wings, while the female is quite wingless.

* * * * * *

Complaints had been received in previous years of a 'worm' seriously damaging tobacco crops in Kurdistan. I suspected one or more species of 'cutworms' (Noctuid caterpillars), but could find no trace of any such pests in June, 1928. The planting out of young tobacco seedlings had been deliberately kept back in some places to avoid attacks by locusts, and I saw some plantations of seedlings which had only been set out about June 20th. Except for the invasion of locusts just described, all the plants, younger and older, were healthy.

After resting sheltered from the heat in a booth at Kaolas, I was met by an escort of native mounted police sent by the Mudir of Penjwin, with riding-horses and pack-mules. The ride to Penjwin, though only about 16 miles, was over a very mountainous tract and lasted five hours. A river (one of the small upper tributaries of the Diala) was crossed, fringed with scrub of a species of smooth-leaved elm, in fruit. Then a steep and lofty

ridge had to be climbed, a pass crossed, and we descended into an extensive but not very dense forest of large-leaved evergreen-oak —no mere scrub, but big timber. Large old hawthorns stood at intervals along the track, while by following the course of a pretty torrent, bordered by willows, planes and maples, we came to the valley of the Qarachulan. This clear, swift river is a tributary which flows North-West into the Lesser Zab, which runs South-West to the Tigris. After following it up stream for a while our path turned North out of its beautiful glen, crossed another pass, descended on to a broad open valley and finally led us to Penjwin.

Notwithstanding the great difference of climate, the views in this very beautiful country recall some of the more wooded parts of the Scottish Highlands. The mountains for the most part reach heights between 5,000 and over 7,000 feet. They are far from being the highest in Kurdistan,* while others in the frontier districts of Iraq attain double that elevation. Scarcely any snow was visible in June, except what is artificially stored for household use.

The oak forests, though I had no time to try them, would doubtless be a rich collecting-ground. As it was, I came in contact with certain of their products of an entomological nature. From very ancient times these woods have been the source of part of the supply of oak-galls used in the manufacture of inks and dyes. Galls are still collected there for this purpose, and the market for them is discussed periodically in the commercial columns of the *Baghdad Times*. I cannot say whether they are mainly galls of *Cynips gallae-tinctoriae* or of other CYNIPIDAE. The only one that I brought back was found lying in the path. It is a large spherical gall about 40 millimetres (a little over 1½ ins.) in diameter, with a number of little sharp projections. It is much larger than the galls of *C. gallae-tinctoriae* in the British Museum, and Mr. Laing tells me it resembles those of *Cynips insana* Mayr. (the 'Dead Sea Apple,' the origin of the dye called Turkey Red) more nearly than any other species in the Museum, though there are small differences.

The other product of the forests is of a more problematic nature, though I believe its origin to be entomological. In any case the facts are worthy of record, though further investigation may be needed to clear the matter up. At the Mudir's house at Penjwin I was given, among other agreeable native dishes, a sweet, thick, blackish, treacle-like conserve which, my interpreter

* An outstanding high mountain in all this district is Pir-i-Mukurun Dagh, 8598 feet ,seen from Sulaimania to the north-west.

told me, was produced by manna-insects in the oak woods. He called it by its Turkish name, *kudret halvassi,* or 'divine sweetmeat.' He said also that two kinds of manna are found in the forests, one on the foliage of the oaks and the other on rocks. The author of a classical work on Kurdistan, Claudius Rich, who visited the country in 1820, tells just the same story. He writes that manna is found on the dwarf oak and on several other plants, and describes the method of its preparation: and that a second kind is found on rocks, which is quite pure and white: also that the manna season begins at the end of June, and that the Kurds said the substance was always found most abundantly after exceptionally cool nights, when it rains manna. Rich uses exactly the same Turkish name for the conserve as that used by my interpreter, and also gives Kurdish, Persian and Arabic names, but he does not explain the origin of either kind of manna.*

Actually the substance found on rocks is probably a lichen, *Lecanora esculenta*, well known to be regarded as a food sent from heaven in various parts of the East.* That taken from the oaks is probably a product of scale-insects of the genus *Kermes,* from which not only red dyes, but also syrups, have been made since ancient times.† I cannot be certain, but think that the 'divine sweetmeat' which I ate was from this latter source. At any rate it is quite distinct from the Israelitish manna excreted by scale-insects on tamarisk in the deserts of Sinai and Arabia. This has lately been determined by Dr. F. S. Bodenheimer, on an expedition to Sinai, as the excreta of COCCIDAE of the genus *Trabutina*, peculiar to tamarisk, while *Naiacoccus* may also excrete a substance of like nature.‡

The Arabs, apparently, have different names for the two products, for they call the true tamarisk-manna of the desert *man,* and the manna of the Kurdish oak-forests (according to Rich) *musee.*

Penjwin (altitude approximately 4,500 feet; Pl. III, fig. 1) lies on the mountain-spurs at the foot of the frontier range between Iraq and Persia, at the edge of a wide grassy plain. It is less than two miles from the nearest part of the frontier. A projecting ridge

* C. J. Rich, *Narrative of a Residence in Koordistan*, vol. i, pp. 142, 143. 1836.

* *Guide to the Exhibition of Animals, Plants, and Minerals mentioned in the Bible*: British Museum (Natural History) Special Guide No. 5, p. 41, 1911.

† Mr. Laing has called my attention to a statement by Planchon and Collin (*Les Drogues d'origine végétale*, i. p. 749, 1895) about a sweet manna formed in pale brown grains on several species of oak in Kurdistan and Persia, also to a remark by Planchon (*Le Kermes du Chêne*, p. 11, 1864) that 'this kind of manna falls at night in the months of April and May.' Further, in the article 'Manna' in *Encyclopaedia Britannica*, oak manna is said to be obtained in Kurdistan from the puncture of an insect See also D. Sharp, *Cambridge Natural History, Insects*, vol. ii, p. 697.

‡ Letter from Mr. E. E. Green, i. 1929. Mr. Green wrote on the subject at an earlier date, Ann. Mag. Nat. Hist. (ix) 12, pp. 697, 698, 1923.

partly encircles it, forming a kind of natural amphitheatre. The houses are so situated that the flat roof of one house often forms a level space used by the inhabitants of the house above. Most of the people were living largely in summer-booths built of the boughs of the evergreen oak. The Mudir, who entertained me most hospitably, was transacting his daily business in such a booth on the roof of the house below his own; my camp-bed stood in the open on the same roof, a dressing-room being formed out of a little breast-high enclosure of matting.

Something has been written of pests of wheat, tobacco and beet, and of locusts. At Penjwin it remained to survey the work of one of the worst classes of pests in Kurdistan, namely, fruit-pests. On June 25th I visited orchards up the hills immediately behind the town. The fruit was principally a small kind of greengage. They were still on the trees, and were badly damaged with deep and wide holes eaten in the flesh by the adults of a weevil, *Rhynchites auratus* Scop., the larvae of which were found inside the stones. Almost every fruit opened had a nearly full-fed larva in its kernel. This species belongs to the sub-genus *Rhynchites* s. str., in which there is no leaf-rolling habit, but the eggs are laid directly in stone-fruit or in apples. The female is said partly to sever the stalk at the time of oviposition, so that the fruit falls some time afterwards, but I did not personally remark any signs of this habit. At any rate the fruits fall and the larvae enter the soil to pupate. The number of generations *per annum* is not known and may vary with the latitude. In this connexion, I found no adults in the greengage orchards, but several, including a pair *in coitu*, were taken in an abandoned orchard of black plums near by. The fruits here were unripe and still green, and badly damaged by the adult weevils, but no maggots were found in their kernels. I cannot say whether the adults taken were early-emerged individuals of the generation hatched from eggs laid in the spring, or belated members of the over-wintered generation, but the former is more likely. Attempts to rear the larvae and follow the life-cycle through the summer in captivity were unsuccessful. Little can be recommended at present but the regular collection and destruction of fallen fruit, and digging up of the soil in winter to destroy the pupae.

Several examples of a Pentatomid bug, *Piezodorus incarnatus* Germ., were taken on the greengages. This occasionally assumes the status of a serious pest, in Italy and elsewhere. At Penjwin any damage it may have done was effectually masked by the much more serious depredations of the weevil. The cultivators called it

'sunn,' from its superficial resemblance to *Eurygaster*, with which several other PENTATOMIDAE are confused.

Some of the orchards were hedged with wild roses, but their flowers were quite over. Yet several late-summer plants were in blossom: agrimony, Saint-John's wort (*Hypericum*), a big blue *Anchusa*, the yellow Labiate *Phlomis* and various aromatic Labiatae, blackberries, and tall pink and white mallows more delicate than hollyhock. In the abandoned orchard and on the sides of a ravine near by were quantities of a tall milfoil with deep yellow flower-heads, flat and compact. It was probably identical with one of those cultivated in English herbaceous borders (possibly *Achillea filipendulina* Lam.). There was only opportunity for a little very casual general collecting among the flowers and herbage, but the following species were picked up:—COLEOPTERA: *Exochomus nigromaculatus* Goeze (Coccinellidae); *Adoretus discolor* Fald. (Rutelidae); *Oxythyrea cinctella* Schaum (Cetoniidae); *Mylabris maculata* Ol., *M. scabiosae* Ol., *M. quadripunctata* L., var. *adamsi* Fisch. (Meloidae); *Mordellistena pumila* Gyll. (Mordellidae); *Sitona callosa* Gyll. (Curculionidae); *Chlorophorus varius* Müll., *Leptura cordigera* Füssl. (Cerambycidae); *Crytocephalus morei* L. (Chrysomelidae). HYMENOPTERA: *Eucharis punctata* Först. and a Mutillid, *Ephutomma syriaca* André. RHYNCHOTA: *Ancyrosoma albolineata* F., *Peribalus vernalis* Wolff. (Pentatomidae); *Gonocerus insidiator* F. (Coreidae); *Lygaeus pandurus* Scop., *Aphanus alboacuminatus* Goeze (Lygaeidae); *Cicadatra glycyrrhizae* Kol. (Cicadidae). LEPIDOPTERA: only one species, *Mormoria neonympha* Hübn. (Noctuidae).

* * * * * *

Two days were devoted to the return journey to Sulaimania, and soon after 5.30 a.m. on June 26th we left Penjwin, accompanied by the Mudir, to ride to Wulyawa. When scarcely out of the town, we met two peasants riding in from the direction we were taking, who had been robbed by an armed gang. Other incidents had happened recently, and some of the perpetrators had been recognised as notorious characters. Great efforts were being made by the Government to round them up—a difficult process in a rugged and forest-clad country, with an international frontier close at hand. At any rate, the Mudir advised our returning to Penjwin and sending a wireless telegram to Sulaimania asking which route we had best follow. Entomologically the delay was fruitful, for I spent the morning on the steep slope of the projecting spur which embraces the town (and from which the photo-

graph, Pl. III, fig. 1, was taken). It was a bare, dry and stony place, but dotted with tufts of aromatic herbs and other low plants. Many Neuroptera were flying low over the ground, and in a short time we had examples of five species: *Pignatellus irroratus* Ol. (*extorris* Nav.), *Myrmecaelurus trigrammus* Pall. (MYRMELEONIDAE); *Theleproctophylla variegata* Klug (ASCALAPHIDAE); *Olivierina extensa* Ol., *Nina ephemera* Gerst. (NEMOPTERIDAE). Mr. Esben-Petersen, who kindly named them for me, had only hitherto seen one example of *Nina ephemera* (Pl. V, fig. 7), the unique type in the Greifswald Museum. So the single male caught at Penjwin may be only the second specimen known. I had never beheld any NEMOPTERIDAE alive before, and three examples of *Olivierina extensa* settled on a single tuft of grass, with the wings spread out much as in Pl. V, fig 6, were a remarkable sight. The flight of these creatures is weak, and the hind wings seem to be held out at an angle to the body and trailed through the air.

At length a reply came from the Administrative Inspector at Sulaimania, bidding us continue the course marked out, and at 1 p.m. we started on the 24-mile ride, escorted by six mounted police, two of the Mudir's armed retainers, and the Mudir. After traversing the grassy plain we crossed the ridge of the Tariyar Dagh by a pass reaching 6,000 feet or more (Pl. III, fig. 2). The slopes on both sides of the range are covered with really fine forest, which thins on the top, and oaks of several kinds (judging by their foliage*), both evergreen and deciduous, predominate. Maples, then bright with their hanging winged fruits, abound, while ashes, willows and other trees grow in the deep ravines cut out by streams. Next came a succession of canters over a stretch of lower, rolling, grassy hills, dotted park-like with oak and hawthorn—the scene of a pitched fight between Government forces and Kurdish nationalist insurgents about fifteen months earlier, before the blockhouses were built or permanent administration of the country begun. Time could scarcely be allowed on this ride for taking a few photographs, let alone collecting insects. Owing to our late start we were benighted far from our destination, and rested at dusk in a solitary tea-house, the only habitation in sight. These tea-shops, sometimes consisting of the roughest edifice with a verandah of cut boughs in front, stand at intervals along the caravan-routes, often in very lonely places. Water is kept hot in samovars and tea provided at all hours, so that the

* I have purposely refrained from trying to decide how many kinds of oak I saw, or their names. *Quercus coccifera* may have been among them. But I believe the leaves of some speeies vary greatly in size and shape, and I have no specimens to compare with those in our herbaria.

shops are a real boon to wayfarers. A further ride of an hour over very rough ground, by the light of a half-moon, brought us to the police-blockhouse at Wulyawa (Pl. IV, figs. 3, 4), where the Assyrian garrison gave us hospitality for the night.

At a moonlight supper on an open terrace in the fort we were much bitten by mosquitos, but I could get no specimens. The place seemed to have rather a bad reputation for mosquitos, in spite of its elevation (about 4,000 feet). Malaria is prevalent in these mountain-valleys, and I heard much from the interpreter about the mortality caused thereby, especially among infants, and the dire permanent effects on the health of some of the survivors. Sources of the trouble are said to be imperfect drainage, badly kept irrigation-channels, and the situation of small swamps for rice-growing too near to villages. The whole problem calls for a survey by experts.

Little remains to tell. Early on June 27th, after an unsuccessful search for *Eurygaster* aestivating under scrub-oak near the blockhouse, we rode seven miles to a tea-house near Naudeh, descending into a deep valley and re-crossing the Qarachulan, here a broad shallow river, by a ford. The country is still very mountainous but much barer, with thinner scrub and a few small vineyards clinging to steep mountain-sides. I came near to losing nearly all the results of my tour, for at Naudeh the satchel containing the specimens, which had been hung on the pack-saddle of a mule, was found to have been jolted off and lost. But it was found in the path by a mounted policeman who hurried back along our track. At Naudeh we parted from the escort, were met by the car, and returned to Sulaimania by a circuitous route of 28 miles, viâ Arbat. On the way we passed through a dense swarm of flying locusts, as described above.

Next day I had a long interview with the Mutasarrif of Sulaimania. What I had heard on all sides was then confirmed by the chief native official of the Liwa—viz., the eagerness of the people for help in improving their methods of agriculture and tackling insect pests. The Mutasarrif was also anxious for instruction to be given in silk-culture. That afternoon I motored back to Kirkuk, and on June 29th returned by train to Baghdad.

The insects (other than Neuroptera) were identified at the Imperial Bureau of Entomology, and I am indebted to Dr. Marshall and Dr. Uvarov for fuller information on particular points. My thanks are due to Mr. W. H. Tams for photographing the specimens shown in Plate V, figs. 6, 7.

I have tried to make distances and elevations as nearly accurate as possible. The altitudes are partly from my own aneroid readings and partly from local information. I have checked the figures from the most up-to-date maps at the rooms of the Royal Geographical Society.

EXPLANATION OF PLATES III—V.

PLATE III.

Fig. 1. View of Penjwin. Oak forest is visible at the top of the mountains in the background, which are part of the frontier-range between Iraq and Persia

Fig. 2. Top of the pass over the Tairyar Dagh, about 6,000 feet, showing thin forest of evergreen oak. Some of our party halting in foreground; the Mudir of Penjwin is the first figure from the right.

PLATE IV.

Fig. 3 Village of Wulyawa.

Fig 4. Blockhouse and garrison of Assyrian police, Wulyawa.

PLATE V.

Fig 5. Summer-booth of peasants at Kaolas, used while watching crops.

Fig. 6. *Oliviernna extensa* Ol. ♂ × 1.

Fig. 7. *Nine ephemera* Gerst. ♂ × 1.

MAP.

Sketch-map showing the position of the Kurdish localities visited, in the top right-hand corner, with regard to Baghdad.

January, 1929.

AGATHIDIUM REITTERI GANGLB., A SPECIES OF COLEOPTERA NEW TO THE BRITISH ISLES.

BY HORACE DONISTHORPE, F.Z.S., F.E.S., etc.

Agathidium reitteri Ganglb. Käfer Mitteleur., 3, 248 (1879) (*rotundulum* Reitt. nom. praeocc).

Black, globose, very shining, thorax with margins light-brown, legs and base of antennae red, club black; very finely and hardly perceptibly punctured. ♂ with the left mandible enlarged, or sometimes furnished with a sharp-pointed spine bent obliquely across the clypeus; ♀ with the front tarsi 5-jointed, the intermediate and hind tarsi 4-jointed. Length, 1.5—1.8 mm.

This species comes very near to *A. mandibulare* Stm. and *A. rotundatum* Gyll. From the former it differs in being considerably smaller, with the second joint of the antennae shorter, etc., and from the latter by the much less apparent punctuation, especially of the elytra, and the presence of the spine of the left mandible of the ♂ in some specimens.

When staying with my friend, Mr. Bowhill, at Nethy Bridge last year, we found this species on June 8th in considerable numbers in small powdery fungi on Scots pine branches and stumps.

It is probably mixed in British collections with *A. rotundatum*.

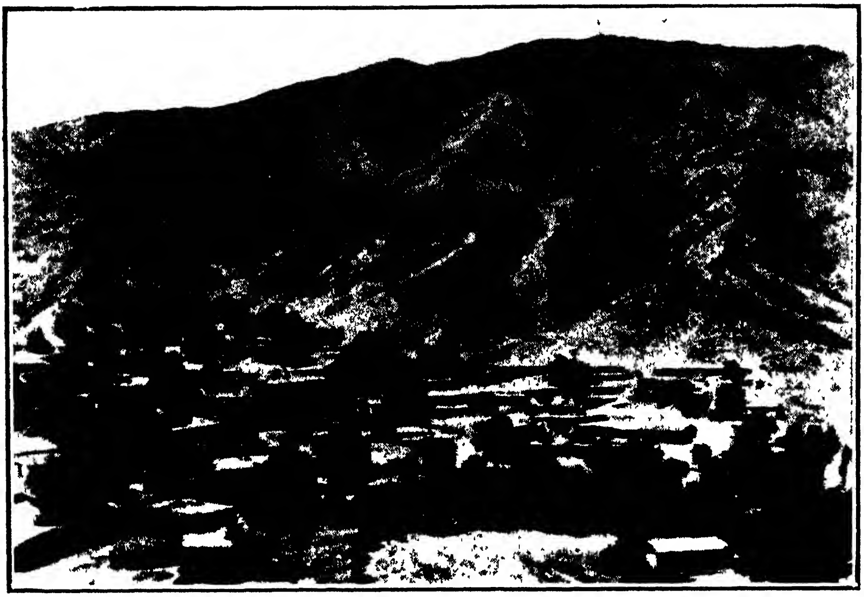


Fig. 1. View of Penjwin.

Fig. 2. Top of Pass over Tariyar Dagh.

Fig. 3. Village of Wuiyawa.

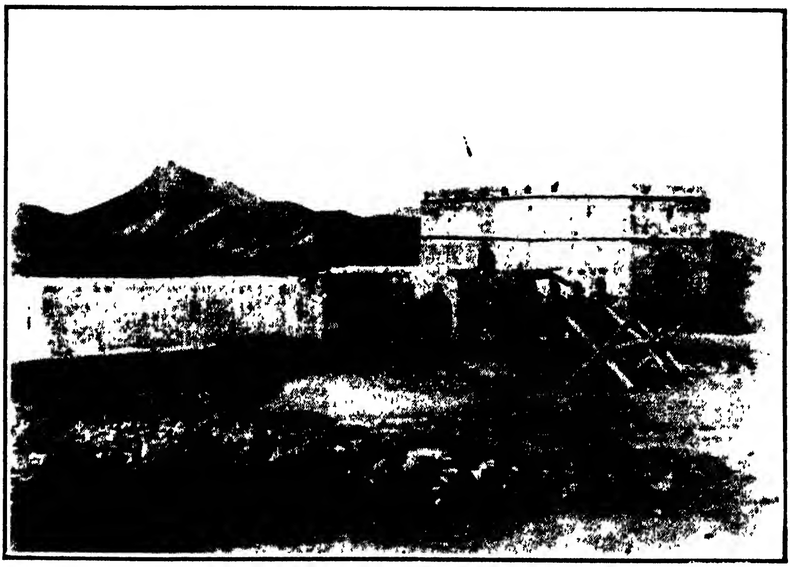


Fig. 4. Blockhouse, Wuiyawa.

Fig. 5. Summer Booth at Kaolas.

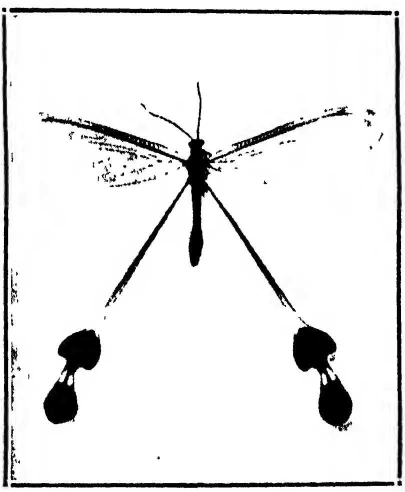


Fig. 6. Olivierina extensa Ol. ♂.

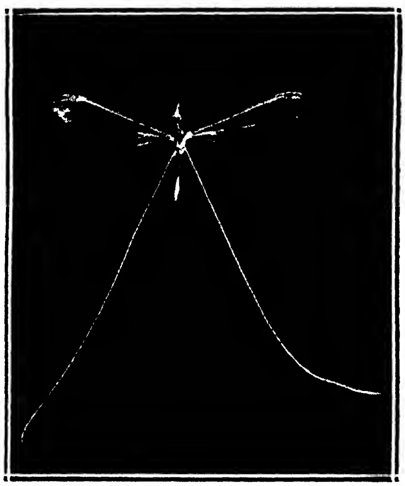


Fig. 7. Nina ephemera Gerst. ♂.

I find I have taken *reitteri* in the New Forest and *rotundatum* at Braemar. My friend Colonel Sainte-Claire Deville, to whom I sent specimens from Nethy Bridge, possesses it from the North of France and from the Vosges. He kindly sent me a specimen of *reitteri* labelled by Ganglbauer himself and one of *rotundatum*, to compare with my examples.

He also points out that *A. rotundatum* was described by Gyllenhal as 'elytra . . . tota nigra . . . vix visibiliter punctulata,' and it was only later that Erichson, Thomson, Ch. Brisout, etc. applied the name *rotundatum* to a species with obviously punctured elytra.

It would appear that *reitteri* is really the *rotundatum* of Gyllenhal, and what is called *rotundatum* should be given another name. It would not be safe, however, to make these changes without seeing the types, and working out Scandinavian material.

19 Hazlewell Road, Putney, S.W.15.
March 17th, 1929.

NOTES ON SOME COLEOPTERA AND A *CHELIFER* OBSERVED ON A RICHMOND PARK OAK AFTER NIGHTFALL

BY H. WALLIS KEW.

These observations were made rather long ago in connexion with work on the Pseudoscorpiones then actively in hand. About 1905 (or earlier) a large, stout and surprisingly scorpion-like *Chelifer* (*C. cyrneus*) was found by Dr. G. W. Chaster in Sherwood Forest and by Mr. H. St. J. K. Donisthorpe in Richmond Park—always under the bark of old oaks.* Concerning this creature, the question arose whether it lived permanently under the bark, or whether it issued forth at night; and, in 1912, further curiosity was aroused by the taking in Sherwood Forest, by Mr. C. J. C. Pool, of two adult females in the daytime in the open. The circumstances were these: Mr. Pool had picked up the Longicorn *Saperda scalaris* from the foliage of a birch, and had transferred the beetle to the palm of his hand, when immediately the two Chelifers alighted from it; the thing was so unexpected, however, that he failed to observe from what part of the beetle they alighted, and thus the manner in which they had been carried remains uncertain. Meanwhile, in Richmond Park *Chelifer cyrneus* had been found to wander abroad on the oaks at night; and, somewhat later, two incidents concerning another Longicorn *Callidium variabile* and this creature came to notice.

* Cf. Trans. Nottingham Nat Soc., 1905-6, pp. 41-46.

Besides the earlier visits to the Park, twenty-eight were made in 1913—1915 (May-September), mostly in June, always to the same oak, and usually during the second hour after sunset. The oak thus visited was one of a group between the Broomfield Hill deer-fold and Spankers Hill Wood; it was of large size and wholly dead, and stood among the bracken in obstinate and dry decay. Over part of the trunk the bark adhered firmly, but on one side much of it was wanting, the exposed wood being mostly firm. In addition to many small cracks, the trunk had several wide fissures; and there were many small holes, evidently old exit borings. Altogether about sixteen hours of dusk and darkness were spent by this tree.

During these years neither the wood nor the bark of the trunk was disturbed, and, when examined in the daytime, it always appeared more or less barren. But at night (when the monotony, if ever existing, was broken by the bats, the owls and the night-jars) the lamp-light often disclosed vast numbers of Arthropods of various sorts. The Coleoptera* more especially were abundantly represented and interesting. And though observations on the Chelifers were the main object, we are here mostly concerned with their treatment of the beetles. Besides the Chelifers' aggressions, large spiders attacked Phalangiids and centipedes, and Phalangiids captured and dismembered small moths, etc.

Among the Coleoptera, *Helops striatus* was the most frequently present and most numerous. The Elaterids *Melanotus rufipes* and *Dolopius marginatus* were often there—less often the Longicorns *Callidium variabile* and *Leiopus nebulosus* and the Clerids *Thanasimus formicarius* and *Opilo mollis* appeared—and among the rest were *Trox scaber, Dryocaetes villosus, Rhinosimus planirostris, Ptinus sexpunctatus, Triphyllus punctatus* and *Trinodes hirtus,* together with others of which, unfortunately, no specimens were taken. *Dryocaetes villosus* often showed itself—many of its burrows in the bark were observed to open to the exterior—and the little *Trinodes hirtus* was walking out on at least four of these nights. The Chelifers (*cyrneus*) were observed abroad on the trunk on all but two of these occasions; they began to come out about an hour after sunset, and when the weather was favourably calm and warm they were often running about in numbers.

The two incidents concerning *Callidium variabile* were as follows. In 1913 (June) this Longicorn was seen hurrying over the trunk with *Chelifer cyrneus* attached to one antenna; the beetle

* Those named were obligingly examined by Dr. Joy.

(about three times the length of its burden) dragging the creature along with it. In 1914 (June) this Longicorn was again seen with *Chelifer cyrneus* attached to it, this time to the femur of a leg. When first noticed the beetle was at rest, but when disturbed it ran rapidly over the bark, carrying the *Chelifer* with it. Both Chelifers were in adult condition, and their attachments were effected by one palp (by obstinate closure of the fingers); their bodies standing off rather rigidly away from the beetles, and their remaining palp being free *i.e.* just as in the cases of smaller Chelifers when hanging to flies, etc. The attachment to the leg, though not that to the antenna, was long maintained. The *Callidium* was carried away in a tube, and placed in a large cell, wherein it tumbled and scrambled about violently—as also did an unencumbered *Callidium* which was placed in the same cell—yet the *Chelifer* was not detached. At least not by midnight, three hours after capture; but next morning the creatures were apart, and neither of them exhibited signs of injury. While thus observed, the attached *Chelifer* (though banged about in the roughest manner possible) appeared throughout wholly composed, persistently maintaining its hold on the leg, never altering the position of its grasp, and often occupying itself by bringing round the free palp fingers to the chelicerae and their combs.

Coleoptera larger than those of Britain have many times been found with Chelifers lodged beneath the elytra. But the only recorded case known to me of a Coleopteron with them on the appendages is that observed by Trappen,* near Stuttgart, wherein *Thanasimus formicarius* carried two *Chelifer* sp. on its legs. The similar attachments to other Arthropods, e.g. Diptera, are, however, frequently observed, and are generally long continued and apparently often passive. The meaning of them — and indeed of the lodgments on large Coleoptera just mentioned—has often been inconclusively discussed,† though it is agreed that one result would be dispersal, and it is evident that *Saperda, Callidium,* etc., may increase the range of *Chelifer cyrneus* as Diptera probably do for smaller kinds. Attachments to enemies may also keep the creatures out of harm's way. Another suggestion is that the relatively large Arthropods attacked may at length be overpowered and preyed on; but that in the case of these Longicorns, though perhaps not impossible, seems unlikely. Apart from such questions, however, it is true that small Coleoptera (even those with hard

* Soc. Entomol. Zurich, xxi (1906), p. 52.

† Cf., e.g., Naturalist, 1901, pp. 193-215: Nature, LXXII (1905), pp. 397, 429, 604, 629-30 Parasitology, VIII (1906). pp. 514-23.

cases) figure largely among the prey of the Chelifers of the present species. From the behaviour of my captive colonies of them it seems that *Dryocaetes villosus* (which often abounds with them on the oaks) probably suffers severely. The captives always appeared well accustomed to these Scolytids, taking them up readily in their hands, transferring them to the chelicerae and mouth, and piercing them between the abdomen and thorax or in the throat. In Richmond Park two cases of *Dryocaetes villosus* in this Chelifer's hands were observed; and Westwood* states that in Windsor Forest he found the hard *Ditoma crenata* being devoured by a large *Chelifer*—probably this species.

One of the *Chelifer cyrneus* with *Dryocaetes villosus* in its hand occurred on our tree at night; and there also another emerged from a crevice carrying *Trinodes hirtus* similarly between its fingers. Still another was in possession of *Rhinosimus planirostris,* the beetle in that case being dead or nearly so. Others occupied the old exit borings (already mentioned)—whence their palps were extended—and one thus lodged was found to have seized *Rhyncholophus phalangioides* (a large grotesque mite), which was dragged at length into the boring.

Among other creatures on this tree at night were certain Hymenoptera, e.g. *Crabro peltarius* which commonly occupied the old borings and less often sat out in the open. Many spiders (large and small) were there, and many small Diptera, together with small Lepidoptera, the Phalangiids, mites, woodlice and earwigs.

60 Richmond Park Road, East Sheen, S.W.
February 2nd, 1929.

THE TENTORIUM OF HEMIPTERA CONSIDERED FROM THE POINT OF VIEW OF THE RECENT WORK OF SNODGRASS.

BY F. MUIR, F.E.S.

Snodgrass has given us another of his morphological works which for clearness of description and beauty of illustration hold a unique place.† In this work the author has brought together considerable information on the embryology, development and morphology of the insect head, and compares it with various other heads of anthropods, thus trying to reveal the common type from which the several types of insects have evolved.

After discussing the anthropod head, he goes on to discuss

* Entomologist's Text Book, 1838, p. 145.
† R. E. Snodgrass: 'Morphology and Evolution of the Insect Head and its Appendages.' Smithsonian Miscellaneous Collections, Vol, 81, No. 3, Nov. 20, 1928.

the general structure of the insect head and appendages. This is followed by a detailed description of the head, appendages and muscles of *Dissosteira carolina* as an orthopteroid type. Then after some remarks on some modifications on the typical form, the head of the caterpiller is described. Snodgrass draws a number of interesting and important conclusions which cannot be discussed here. His eighteenth point (page 93) deals with the tentorium in which he says :—

'The points of origin of the ventral adductors of the gnathal appendages in myriapods and insects were probably crowded together when the gnathal segments were added to the protocephalon. They have since become supported on a pair of apophyses arising at first from the base of the hypopharynx. In the myriapods and in most of the apterygote insects, the apophyses still maintain their hypopharyngeal connections; but in the pterygote insects their bases migrated laterally to the margins of the cranium, and in all but some of the lower forms have finally moved to a facial position in the epistomal suture. Their posterior ends have united with the transverse tentorial bar developed in the back part of the head. The hypopharyngeal apophyses of the Myriapoda and Apterygote have thus come to be the anterior arms of the pterygote tentorium.'

Hitherto we have tried to homologise the head of Hemiptera with that of Orthoptera, and have considered the anterior arms of the tentorium as arising from the suture of the head capsule. In this we have been wrong, for the large arms of the tentorium, which are so conspicuous, arise from the hypopharynx. Their apices are joined by a slender bridge which give rise to the dorsal arms; in the nymph invaginations (posterior arms) arise from the posterior suture and are connected to the hypopharyngeal invaginations by ligamentous connections which in the adult are wide and more highly chitinized. The large hypopharyngeal invaginations are membraneous, their walls strengthened by longitudinal chitinous areas; the lateral portions of their walls may be formed from the maxillary plate, as their openings are beside the maxillary plates and the maxillary sectae are in intimate relation to them.

Thus Snodgrass and the writer have hitherto gone astray in placing the position of the anterior arms of the tentorium in the frontal suture. The structure considered as such by the writer is an invagination at the anterior end of the frontal suture, and is in intimate contact with the ventral wall of the pharynx. That the tentorium in Hemiptera arises from the hypopharynx and not

from the anterior portion of the head capsul appears to be evident, and it therefore places this order along with the myriapoda and most of the apterygota so far as this structure is concerned. This gives the Hemiptera a much more primitive origin than hitherto allowed, but it fits in with their geological age.

The origin of the anterior arms of the tentorium cannot be used as a point of orientation in considering the limitations of clypeus and frons, and so we must turn to other evidence. The contention of Snodgrass that what has hitherto been considered the 'pharynx' pertains to the mouth I cannot admit at present, although I recognise its possibility. If he be right then the case of the fulgorids will have to be reconsidered, for it is difficult to believe that an ocellus can be situated in the apex of the anteclypeus.

The Hemiptera have been considered as arising from the Psocidae or both from a common stock, but the Psocidae have the normal orthopteroid origin for the anterior arms of the tentorium and have no hypopharyngeal apophyses, so it is doubtful if the two orders have any near relationship, and the whole question will have to be reviewed from a new angle. It is possible that we may have to look to such an arrangement of the mouthparts as is found in the Collembola (i.e., *Orchesella*) for a starting of the Hemiptera.

Thus Snodgrass' work has not settled the enigma of the Hemiptera but only caused the specialists in that group to look into the quesion anew with better understanding, and this is likely to be the case with other problems in the various orders.

In the opening paragraph of his work Snodgrass disposes of the bugbear of consistency, in which the present writer agrees, for if one remains consistent to scientific theories from youth to old age one will die in many errors. While making use of the musculature for defining various morphological units, he wisely points out that it must be done with reason as muscles do alter their positions, arise, disappear and break up. Another point of great importance to which he calls attention (p. 90), and on which the writer has also insisted, is that the study of morphology should be considered from a point of dynamics and not static, that function must be considered as it is often the moulder of form.

The work should find a place on the bookshelf of every student of insect morphology.

The Den, Farnham Common, Bucks.
February 5th, 1929.

ADDITIONAL NOTES ON PSOCID BIOLOGY (OVIPOSITION).

BY J. V. PEARMAN, F.E.S.

To avoid continuing the series into a new volume, the fourth section of my 'Biological Observations' published last year (E.M.M., lxiv, p. 209 et al.) was curtailed. Certain matters of interest were omitted, since they involved consideration of details of morphology, and could be discussed more conveniently in separate communications at a later date. The present notes supplement those on oviposition.

From females of *Pseudopsocus rostocki* Kolbe, taken last September, egg batches have been obtained. The eggs, as I supposed, do have an excreted coating, and are very like those of *Reuterella helvimacula* Endl. in appearance and size. Indeed, so close is the resemblance that without knowledge of their parentage it would be almost impossible to say to which species the eggs belonged. There is, however, a hardly noticeable difference in the number and arrangement of the eggs—usually the batches of *P. rostocki* contain more eggs, more closely packed, than do those of *R. helvimacula*. The difference follows from a dissimilarity of habit. Between successive periods of active oviposition *Reuterella* is inclined to wander, but *Pseudopsocus* remains in one place until all its eggs have been deposited. As in the case with *Reuterella*, the egg-masses of *Pseudopsocus* are often overspun with threads which may form a weak, wide-meshed net, or consist of only a few strands.

The so-called 'geophilous' *Kolbia quisquiliarum* Bertk. was detected in the autumn on the Somerset coast, where it was found among grass roots on the seaward-facing slope of sandhills. Egg-masses have been laid by females in captivity on split dead stems of *Ammophila*. They are in all respects similar to those of *Caecilius kolbei* Tet. The latter occurs also in the same locality, but is usually found high up the stems of the marram grass. Whereas the eggs of *C. kolbei* hatch about a fortnight after laying, those of *K. quisquiliarum* pass through the winter unhatched.

In my remarks on the possible value of the crusty coating with which certain Psocids cover their eggs, I suggested that some protection might thereby be afforded against the attacks of Mymarids. Recently I have had a striking demonstration of the erroneousness of that supposition. By the kindness of Dr. J. W. Campbell, of Christchurch, N.Z., and Dr. G. C. Crampton, of Massachusetts, I have received four egg-masses of *Myopsocus novae-zelandiae* Kolbe. The eggs are overlaid with a dense coating of woody particles and minute sand grains, yet nothwith-

standing such impediment *every egg in all four batches* had been parasitised by a Mymarid.

There are some accounts of Psocid web-spinning, where references may perhaps be made to egg-laying, in scattered papers, several of which I have not yet been able to consult. In one by Morstatt (Ub. Vorkomm. v. Gespin. b. Psoc., 1912, Zeitsch. f. wiss. Ins.-biol., VIII, p. 142) there is a note on the eggs of *Archipsocus* sp. They are described as being laid in the folds of dry, overspun leaves, in masses of about fifty; they are brown in colour, but somewhat paler in parts, and, as seen from above, rough in appearance, though found to be smooth on the side contiguous with the leaf, to which they are fastened by short threads. The appearance of roughness is, in my opinion, probably due to a coating of excreted matter, and the description leads one to infer that the eggs have some resemblance to those of *Reuterella helvimacula*, an insect whose mode of life is not unlike that of the exotic *Archipsocus* species.

32 Cornwallis Crescent, Clifton, Bristol.
February 25th, 1929.

ON A NEW SPECIES OF *TRICHOTHRIPS* FROM AUSTRALIA.

BY RICHARD S. BAGNALL AND REGINALD KELLY.

This new and distinct species is unfortunately based on a single casual example that had flown on to a newspaper. It comes into the *ulmi-corticis-britteni* group, and is distinct from all in its coloration; not only has it light lemon yellow tibia and an orange yellow tube, but the antennae are peculiar in that the second joint is the lightest. Antennal joints 7 and 8 are *not* closely united, and joint 8 is very slender and long, being about subequal in length with 7.

We find particular pleasure in naming the species after our friend and mentor, Professor E. B. Poulton, F.R.S.

Trichothrips poultoni sp. n.

♀. Length about 2.0 mm.

General colour brown, head and pronotum more darkly and uniformly shaded with dark grey-brown than the pterothorax and abdomen; tube orange to reddish-yellow in the basal half, shading to a nondescript pale grey-brown distally. Femora brown, paler distally and basally, and all tibiae and tarsi (except for blackish-brown distal spot) pale lemon-yellow. Wings fumate. Antennae with joint 1 practically concolorous with head, 2 yellowish lightly tinged with grey to grey-brown basally, 3 yellowish basally shading gradually to dark brown distally, 4 to 8 dark blackish-brown, 4 and apparently 5 somewhat, though very slightly, lighter basally. Bristles pale, terminal hairs of tube

fumate. The wings, which reach to the tube, are folded down the back, but the ends are displayed and the fore-wing is shown to have at least a dozen duplicated cilia. The general form is as in the group *ulmi-corticis-britteni*, but the antennal joint 8 is not only well separated from 7 but subequal in length. Fore-tarsal tooth sharp.

The following are the measurements :—

Length (and breadth behind eyes) of head and the length (and greatest breadth) of pronotum, 250 (250) and 200 (400) μ respectively ; breadth of pterothorax 512, and of abdominal segment 4 about 600 μ ; length (and breadth at base and at apex) of tube 250 (108 : 50) μ. Length (and breadth) of the femora and tibiae as follows : I, 244 (112), 182 (50) ; II, 200 (68), 188 (48) ; III, 280 (82), 270 (50) μ ; whilst the lengths (and breadths) of the antennal joints are approximately 50 (50), 70 (40), 88 (45), 91 (42), 82 (38), 77 (36), 65 (28), 65 (19.5) μ.

Length of bristles—postoculars 136 μ, fore-coxal 105 μ, pronotal antero-angular, mid-lateral and postero-angular 80, 150 and 165 μ respectively, abdominal segments 7, 8 and 9 approximately 250, 225 and 220-275 μ respectively. Length of terminal hairs c. 188 μ.

AUSTRALIA, Hawthorn, Victoria, 1 ♀ on newspaper whilst reading (R. Kelly n.s.45) 9, xii, 1927.

Three other species of Australian *Trichothrips* are known, all of which have the antennal joints 7 and 8 more or less broadly united. Of these, *T. erinaceus* Karny (1920) is a dark species with pale intermediate antennal joints ; *T. melanurus* Bagnall (1919) is a lighter species, not unlike the European *pedicularis* Hal., with pale tibiae and a very dark tube ; whilst *T. connexus* Hood (1919) is also a light species, having the third antennal joint, all tibiae and tube yellow and wings light brown. In fact, *T. poultoni* in its type of coloration agrees closely with *T. connexus*, but that species is smaller and has dark antenna with the third joint abruptly yellow, whilst the apical joints are connate, and there are numerous points of difference in form and measurements.

March 9*th*, 1929.

Captures of Coleoptera and Hemiptera in 1928.—The past season was undoubtedly a disappointing one for field work, but, as is usually the case, exceptional conditions often prove to be ideal for species generally considered local and scarce, and the following notes recording those I have met with may therefore be of some little interest.

I did no collecting until early April, when a visit to my friend Mr. C. E. Scott in Staffordshire enabled me to become acquainted with that classical locality Cannock Chase, now, alas, shorn to a considerable extent of its former glories owing to the removal of large areas of trees and to the numerous collieries within its borders. The only beetles met with worth passing mention are *Lesteva fontinalis* Kies, which occurred in plenty in moss below a sluice, *Microglossa marginalis* Gyll. and *Quedius brevicornis* Th., found sparingly in the remains of a bird's nest in a hollow tree.

Whitsuntide spent at Hartlebury with Mr. G. H. Ashe enabled me to meet for the first time with several of the scarce species discovered by him in the

district. *Saprinus virescens* Pk. was not uncommon on hemlock in a lane. Three specimens of *Megapenthes tibialis* Lac., found crawling over the bole of a very ancient oak, were a great joy to take, as was also a series of *Anthribus fasciatus* Forst. beaten from adjacent oaks; whilst, with the aid of an electric torch, *Opilo mollis* L. was captured at night on the same trees and a single specimen of *Ptinus sexpunctatus* Pz. was found crawling up a wall.

A joint visit to Pontrilas in search of *Cryptohypnus sabulicola* Boh. was spoilt by rain which commenced directly we reached our destination, and it was only with much difficulty I secured three specimens.

A day in Wyre Forest in search of *Rhizophagus aeneus* Richt. (*coeruleipennis* Sahlb.) resulted in the discovery of a strong colony in the crevices of elm bark on logs in a stream. It does not seem to be a sub-cortical species like its congeners, and I was also surprised to see how very much at home the species appeared to be under water. The only other capture of any note was *Xyleborus dispar* F., specimens of which were cut out of stumps, but all were ♀'s.

Early in June a week-end with Mr. Fryer at Chatteris enabled me to secure a nice series of *Ceuthorrhynchus angulosus* Boh. by sweeping *Stachys*, together with single specimens of *Chrysomela fastuosa* Scop. and *Ceuthorrhynchus nigrinus* Marsh. An old medlar tree in an orchard produced, after several visits, a series of *Magdalis barbicornis* Lat. and a few *M. cerasi* L. A short halt at Feltwell Fen, whilst on an expedition to Methwold, resulted in the discovery of a small series of *Callidium variabile* L. in an old gate-post, and near Methwold *Ceuthorrhynchus pulvinatus* Gyll., the object of our outing, was found in numbers on *Sisymbrium Sophia*, together with three specimens of *Psylliodes cyanoptera* Ill. var. *tricolor* Weise.

Eysarcoris melanocephalus Fab. was plentiful, as usual, at Box Hill towards the end of June, whist *Gonocerus venator* Fab. appears to me to be getting gradually scarcer, and I had some difficulty in securing half-a-dozen specimens early in September.

A week at Deal in July enabled me to make a search for *Adrastus rachifer* Geoff. in the locality where it was first discovered in this country by the late Mr. E. A. Waterhouse, and I had no great difficulty in running it down. In spite of extreme dry conditions a single specimen of *Scaphium immaculatum* Oliv. was secured in moss near St. Margaret's Bay, together with *Mycetoporus punctus* Gyll. The parched conditions caused all sandhill species to be exceedingly scarce, the only species worth noting being old friends such as *Ophonus cordatus* Dufts., *Harpalus servus* Dufts. and *H. serripes* Sch.; *Hoplia philanthus* Fuss. frequent on the seed heads of a common rush, *Anomala frischi* F. abundant on one day only, and *Ceuthorrhynchus verrucatus* Gyll. not uncommon at the roots of the Horned Poppy (*Glaucium luteum* L.).

A ditch near Sandwich containing small patches of *Azolla* produced a short series of *Stenopelmus rufinasus* Gyll., whilst from patches of Melilot *Sitones meliloti* Walt. and *Tychius meliloti* Steph. were obtained, but the latter species was scarce and worn.

A further visit to Methwold, Norfolk, early in August with Mr. B. S. Williams resulted in the capture of *Psylliodes cyanoptera* Ill. and its var., *tricolor* Weise, in considerable numbers; among them was a specimen, captured by Williams, having blackish elytra and thorax and red head; this specimen he insisted on presenting to me, and I now name it var. *bicolor*. *Ceuthorrhynchus pulvinatus* Gyll. again occurred, but this time very sparingly; *C. rapae* Gyll. was also present, and we each secured a short series. A halt at Worlington on our way to Wicken enabled us to capture a few *Apion brunnipes* Boh. (*laevigatum* Kirby)

under cudweed, whilst Freckenham sandpit produced nothing better than *Apion sedi* Germ. Wicken Fen was very unproductive: a few specimens of *Trechus rivularis* Gyll. were taken, together with *Olophrum nicholsoni* Donis., *Dryops nitidulus* Heer., *Limnebius papposus* Muls. and *Anthocomus fasciatus* L. *Ranatra linearis* L. was not scarce, and one specimen of *Corixa dentata* Th. I found later amongst my captures.

In mid-September Dr. Nicholson kindly enabled me to take a series of *Macrocephalus albinus* L. at Wivelsfield, Sussex; it was obtained by beating old wattle fencing, and with it were a few *Tetratoma ancora* F., a couple of *Pogonochaerus hispidulus* Pill., and plenty of *Aneurus avenicus* Duf. A joint expedition to Ditchling in search of *Apion kiesenwetteri* Desbr. was successful, the species being found in some numbers in the seed pods of *Genista tinctoria* L.

Later in September a day or two in the New Forest produced a short series of *Elater lythropterus* Germ. from old beech logs, whilst in damp sphagnum from an almost dry bog fourteen specimens of that very tiny Hemipteron *Pachycoleus rufescens* J. Sahlb. were found, but unfortunately most of them went to pieces before I had an opportunity to mount them.

At the end of October a week-end at Wye, Kent, with Mr. A. Duffield produced *Macrocephalus albinus* L. and *Pogonochaerus hispidulus* Pill. under the same conditions as in Sussex, whilst *Apteropeda globosa* Ill. and *Liosoma pyrenaeum* var. *troglodytes* Rye. were not uncommon in moss.—E. C. Bedwell, 54 Brighton Road, Coulsdon: *February 21st*, 1929.

The Occurrence of Gnorimus nobilis L. in Kent.—Seven mature larvae of this pretty chafer were found on the 9th April, 1928, in the rotten wood mould of a decayed damson tree growing in a private garden at East Malling, Kent. The larvae pupated on the 10th and 11th of April. The adults emerged from the 26th April to 9th May. Three more larvae were found near Maidstone, in the wood mould of a decayed 'Black Diamond' plum, on 22nd January, 1929. A tree-cutter informs me that this grub is frequently found in the decayed wood when old plum trees are grubbed and split up for fire-wood. I have come across this larva several times during the last few years, but have not been able to breed it until recently. Probably it is more common in the Maidstone district than is generally supposed.—A. M. Massee, Research Station, East Malling: *March 13th*, 1929.

Zyras (Myrmedonia) haworthi Steph. in Dorset.—On March 10th, when working at grass tufts near Studland, I was fortunate in taking a specimen of this rare Staphylinid beetle, which apparently has not been found in the county since 1884. There were numerous colonies of *Lasius flavus* and species of the genus *Myrmica* in the vicinity, but *L. fuliginosus*—its supposed host—is rarely seen in the locality. I have, however, found a colony at the foot of a small fir tree growing in a boggy hollow in the sandhills, about one and a half miles from where the *Z. haworthi* occurred. *Z. collaris* has been met with on several occasions in the vicinity, six turning up within a few yards of the greater rarity. —P. Harwood, Bournemouth: *April 14th*, 1929.

Note on Medon propinquus Ch. Bris. occurring in moles' nests.—In 'Faune des Coléopteres du Bassin de la Seine,' Tome II, p. 149, Col. Deville gives the following note on the habits of *Medon melanocephalus* F.

'Cette espèce a une tendance marquée à rechercher le voisinage des fourmis et les nids des petits mammifères. A Gudmont (Haute-Marne), je l'ai capturée

dans les colonies du *Tetramorium caespitum* L. et dans les nids de taupes trop fréquemment et trop régulièrement pour que le fait puisse être fortuit. A Leipsig, Linke (Verzeichniss der in der Umgebung von Leipzig beobachteten Staphyliniden, in Sitzb. der Naturf. Gesellsch. Leipzig (1906-1907, sep., p. 20) la signale avec *Formica rufa* L., avec *Tetramorium caespitum* L. et avec un *Myrmica*, comme aussi dans les nids de hamsters et de campagnols. Bien que n'étant nullement exclusifs, ces habitats méritent d'être signalés. Le fait d'être à la fois myrmécophile et nidicole n'est pas exceptionnel chez les Staphylinides. Il s'explique aisément si l'on observe que les Staphylins font surtout leur proie des petits parasites d'autres ordres (larves de Diptères, Acariens, Thysanoures, Isopodes, etc.) parmi lesquels certains, tels que les Acariens, fréquentent aussi bien les colonies des Hyménoptéres sociaux que les nids des petits Rongeurs.'

During the past few years I have dug up a large number of mole nests in the neighbourhood of Harpenden and Ayot. A fair proportion of these contained *Medon propinquus*, occasionally as many as half-a-dozen occurring in one nest. As *M. melanocephalus* is far from common in this district and is a desideratum with me, each specimen has been brought home for examination: hence it is very unlikely, had *M. melanocephalus* occurred in these nests, it could have passed unnoticed.

From these observations it would appear that *Medon propinquus* in Hertfordshire and *M. melanocephalus* in France are showing a similar tendency to become nidicolous insects.

Bearing on the latter part of Col. Deville's note dealing with the food of Staphylinids in the nests, I have on two occasions seen the common *Heterothops nigra* Kr. running off my collecting sheet, carrying, by means of the mandibles, one of the silky acarids which abound in every mole nest. It seemed as if they had just captured their meals before the nest was disturbed, and intended to retain it at all costs.—B. S. WILLIAMS, 15 Kingcroft Road, Harpenden: *March 20th*, 1929.

Societies.

ENTOMOLOGICAL CLUB.—A meeting of the Entomological Club was held at Caracas, Ditton Hill, on December 6th, 1928, Mr. W. J. Kaye in the Chair.

Members present in addition to the Chairman: Mr. H. Donisthorpe, Prof. E. B. Poulton, Mr. Jas. E. Collin, and Dr Harry Eltringham. Visitors present: Messrs. C. L. Collenette, F. L. Oldaker, H. Main, W. Rait Smith, Capt. N. D. Riley and Dr. Guy Marshall.

The guests were received by Mr. and Mrs. Kaye and light refreshments were served in the drawing-room. Mr. Kaye's collections of Lepidoptera were on view and were examined with great pleasure by the entomologists present. Mr. Kaye specially exhibited two drawers of Erycinidae from Trinidad, containing nearly the whole of the ninety-seven species recorded up-to-date. Mr. H. Donisthorpe exhibited *Mesosa nubila* carrying the predaceous larva of *Athous rhombeus* (Coleoptera). Supper was served at 8 o'clock, after which a business meeting of the Club was held. A very enjoyable evening was spent, and the company dispersed at a late hour. It was reported during the business meeting that further additions have been made to the Entomological Trust Fund. The trustees of this fund are Mr. Robert Adkin, Mr. H. Willoughby Ellis and Mr. J. E. Collin, the latter acting as Hon. Treasurer, to whom donations may be sent.—H. WILLOUGHBY ELLIS.

ENTOMOLOGICAL SOCIETY OF LONDON : *Wednesday, February 6th,* 1929.—Dr. K. Jordan, President, in the Chair.

The President announced the deaths of Dr. J. L. Reverdin, Honorary Fellow, Mr. O. R. Goodman and Major Watkin Temple.

The President announced that he had nominated Mr. J. E. Collin, Dr. R. Stewart MacDougall and N. D. Riley as Vice-Presidents for the coming year.

The Secretary announced that Mr. H. Willoughby Ellis had been co-opted on to the Council to fill the vacancy caused by Captain A. F. Hemming having become Treasurer.

The Secretary read the proposed changes in the Bye-Laws of the Society, to be considered at a special meeting in April.

Captain A. F. Hemming exhibited and made remarks upon *Carcharodus dravira* Moore, and on two new sub-species of *Polyommatus loewii* Zell. Mr. H. Donisthorpe exhibited rare beetles from Windsor Forest. Dr. R. Stewart MacDougall showed examples of the damage done to Birch in Scotland by the Scolytid beetle, *Eccoptogaster ratzeburghi* Jans. Professor E. B. Poulton, F.R.S., exhibited and made remarks upon (1) A communication from Major F. C. Fraser respecting a pair of *Danaida limniace* Cram., *in coitu*, the male being dead. (2) Larvae of the Lycaenid butterfly, *Spalgis lemolea* Druce, observed feeding on Coccidae at Zanzibar by Mr. J. E. M. Mellor. (3) A male *Megachile* attracted by an Acraeine butterfly with the colours of its own female observed by Mr. J. E. M. Mellor in Tanganyika Territory. (4) Mr. E. Step's observation that galls of *Cynips kollari* Hart. are opened by blue-tits. (5) A cockroach, *Ischnoptera pitmani*, a pest in Uganda houses. (6) The resemblance of the Australian Hepialid moth, *Leto stacyi* Scott, to the head of a lizard. (7) On behalf of Mr. J. F. Perkins, the forms of *Colias edusa*, captured and bred in South Devon during the past summer and autumn.—S. A. NEAVE, *Hon. Sec.*

FOSSIL THYSANOPTERA, V.—TUBULIFERA, PT. I.*

BY RICHARD S. BAGNALL, F.R.S.E., F.L.S.

Although larger and heavier in form than members of the Terebrantia, very few species of Tubulifera are known fossil, in fact only the one species of *Phloeothrips* described by von Schlechtendal (*P. pohligi* Schl., 1887) was known prior to the publication of Priesner's Memoir in 1925, already referred to. At least nine species of Tubulifera are represented in the Koenigsberg Collection, of which the following are now described :—

Phloeothrips schlechtendali sp. n.
Schlechtendalia longitubus gen. et sp. n.
Liotrichothrips hystrix gen. et sp. n.
,, *antiquus* sp. n.
,, *discrepans* sp. n.
Trichothrips minutatim sp. n.

The comparative rarity of these larger forms, both fossil and recent, is no doubt due to their greater scarcity in species and numbers and more seclusive habits. Those now described suggest a sub-tropical complex.

* Continued from E.M.M., vol. lxii, p. 17, 1926 (Jan.)

Phloeothrips schlechtendali sp. n.

♀. Length c. 1.42 mm. The type example is well displayed, the antennae lying in a plane with the body: the legs only slightly turned downwards, but the length of the tube cannot be exactly determined, whilst the wings are laid along the back.

The general colour is brown, more or less mottled (possibly in the amber), with the intermediate antennal joints possibly yellow or yellow basally.

Head shaped as in *P. maculatus* Hood and *Neurothrips* (*Acanthothrips*) *magnafemoralis* Hinds—that is, with the cheeks swollen immediately behind eyes (which are reniform) and roundly convergent to base. Cheeks irregularly furnished with spinulose tubercles. Mouth-cone long and pointed, reaching beyond the prosternum. Antennae about twice as long as the head, much as in *P. maculatus*, but more slender: trichomes on segments 3-5 and a single one on 6 about 25μ in length.

Pronotum transverse, only 0.7 as long as the head, and about 1.8 times as broad as long. One postero-angular seta visible, slender, stemmed, 0.365 the length of pronotum, the length being 55μ and the breadth of dilated tip c. 9μ. The fore-coxal seta is also visible and is about 32μ in length. Legs normal: fore-legs not strongly incrassate, fore-femur apparently simple and fore-tarsus with a slender sharp tooth near base. The tube is about 0.75 the length of the head, and the terminal hairs nearly 0.9 the length of the tube. The lateral abdominal bristles are distorted by moisture.

The following are the approximate measurements: Length of head, 212, and breadths across eyes, just behind eyes, and base, 192, 215 and 185 μ respectively; length and breadth of pronotum, c. 150 (275); breadth of mesothorax and of abdomen, 325 and 360 μ respectively, and length of tube (and breadth at apex) c. 160 (34) μ, the terminal hairs being 140 μ in length. The lengths (and breadths) of the antennal joints 3-8 are approximately as follows: 80 (37), 75 (39), 62.5 (32.5), 52.5 (27.5), 47 (25), 44 (16) μ.

TYPE: In Baltic Amber, Koenigsberg Coll., B. 595.

Genus *Schlechtendalia* nov.

♀. Head slightly broader than long and very slightly longer than the pronotum; surface transversely striate; cheeks gently arcuate; mouth-cone reaching across prosternum, short and bluntly rounded at apex. Antennae much as in the *coriaceus* group of *Phloeothrips*, but segment 5 terminally oblique, with the inner angle dentiformly produced and surmounted by a sense-cone. Sense-cones comparatively short and slender. Pronotum transverse; bristles short, tips blunt but not dilated. Legs normal: fore-legs not strongly incrassate, fore-tarsus unarmed except for a minute secondary tooth. Wings long and somewhat broad, fore-wings apparently furnished with a series of duplicated cilia. Abdomen moderately heavy, substantially broader than the pterothorax and elongate-ovate; lateral bristles up to segment 7 not long. Tube long, substantially longer than the head, almost parallel-sided until constriction before apex; terminal hairs only about 0.5 as long as the tube.

TYPE: *Schlechtendalia longitubus* sp. n.

Coming near *Phloeothrips* in general form, this genus may be recognised by the short head (the cheeks of which are not furnished with seta-set warts), the short blunt mouth, the form of the fifth antennal joint and the long tube. It also shows affinity with *Liotrichothrips* nov.

Schlechtendalia longitubus sp. n.

♀. Length about 2.45 mm. With the characters of the genus.

The single example would appear to be of a more or less uniform dark brown, with the intermediate antennal joints probably paler and the wings clear. On one side of the specimen a pair of wings are extended into a disturbed discoloured area, and it is impossible to make out either the sub-basal setae of the fore-wing, of which one is evident, or the duplicated cilia, though there is apparently a series of such.

The legs are turned downwards and the antenna inclined upwards.

Head transverse, about 1.1 times as broad as long, nearly 1.1 times as long as the pronotum, and little more than 0.6 the length of the tube.

The following are the measurements :—

Length (and breadth across cheeks) of head, 270 (295) ; length (and breadth) of pronotum, c.250 (450) ; breadth of pterothorax and abdomen, respectively 462 and 600 μ. Length and breadth near middle of fore-wings, 1,310 (? c.112) ; and length of tube, 438 μ. Length of postero-angular pronotal bristles, c.88 ; of terminal hairs, 218 ; and of lateral abdominal bristles on segments 7, 8 and 9, approximately 155, 138 and 188-212 μ. Relative lengths (and breadths) of antennal joints 3-8 approximately as follows : 138 (44), 106 (40), 94 (40), 68 (35), 56 (30) and 37.5 (20) μ.

TYPE : In Baltic Amber, Koenigsberg Coll., without distinguishing number.

Genus *Liotrichothrips* nov.

Head longer than the pronotum, broader than long ; cheeks converging posteriorly, set with a few prominent setae. Antennae long, with joints 3 and 4 subequal and longer than any of the others. Pronotum transverse ; setae prominent. Legs normally long, apparently of the *Liothrips* type. Wings heavy, not narrowed medianly, and upper wing with a longish series of duplicated cilia. Pterothorax and abdomen much as in the sub-tropical *nigricornis* group of *Liothrips* (*Ischyrothrips*), with bristles long and prominent and tube long.

Suggestive of the *nigricornis-thomasetti* Bagn. group of *Liothrips* (= *Ischyrothrips* Schmutz : *Ethirothrips* Karny), except for the short head, which is prominently though sparsely spinose.

TYPE : *Liotrichothrips hystrix* sp. n.

Liotrichothrips hystrix sp. n.

Length about 2.35 mm.

Colour brown to brownish-black, with antennae apparently entirely dark and wings lightly fumate but paler distally. The specimen has the head set at a slightly upward inclination, the right antenna inclined upwards but exhibiting the four distal joints to advantage, and the other with the 3-4 distal joints turned downwards but showing the 4-5 basal joints on an even plane. The right fore-leg is tucked under the head and the others downwardly directed or under the body, so that no leg is displayed suitably for description. The left pair of wings are partially outspread and well displayed, including the sub-basal bristles. Surface reticulation is shown in the pterothorax basally and in the abdomen laterally, in the basal segments at least.

From the following species, *L. antiquus*, apart from the noticeably longer head, there are so many important differences in the

chaetotaxy that I have found it impossible to treat the two specimens as belonging to one form. The chief differences lie in the noticeably longer genal and fore-coxal setae, the much longer postero-angular and the shorter antero-angular pronotal bristles: the abdomen is broader, the tube longer and stouter, and the abdominal bristles substantially longer as are the sub-basal setae of the fore-wing. The fifth antennal joint is smaller as compared with 3 and 4 in this species than in *antiquus*.

A table showing relative measurements is given under the name of the next species.

TYPE: One ♀ in Baltic Amber, Koenigsberg Coll., without distinguishing number.

Liotrichothrips antiquus sp. n.

Of the same length, colour and general build as *L. hystrix*. The specimen is moderately well displayed, but the under side of the prothorax and the abdomen, especially round the base of the tube, is clouded; the right antennae is perfectly set; the left is twisted, but well displays the four distal joints; the legs are downwardly directed and the right fore-wing is partially outspread. Apart from the shorter head, which is much less strongly convergent, the relatively longer fifth antennal joint and the longer antero-angular pronotal setae, the species would seem to be characterised by its general weaker chaetotaxy.

The relative lengths (and breadths) of the antennal joints 3-8 are approximately as follows:—

L. hystrix sp. n.: 119 (37), 119 (37), c.88 (36), c.88 (36), 55 (31), 50 (17) μ.
L. antiquus sp. n.: 112 (37), 112 (37), 96 (36), 85 (37), 50 (27), 50 (17) μ.

The following are approximate measurements in microns:—

	hystrix.	*antiquus.*
Head:		
Length (and breadth across eyes) ..	275 (288)	239 (275)
Length of—		
(*a*) Genal setae	22-47	20-35
(*b*) Postoculars	106	?
Pronotum:		
Length (and breadth)	188 (375)	?
Length of bristles—		
(*a*) Postero-angular	150	c.100
(*b*) Antero-angular	c.56	75
Fore-leg: length of—		
Coxal seta	c.46	32
Outer long femoral seta	69	44
Breadth of—		
(*a*) Mesothorax	475	475
(*b*) Abdomen	600	560
Fore-wing:		
Length (and breadth near middle) ..	1560 (c.150)	1350 (138)
Number of duplicated cilia	c.22	20
Length of sub-basal setae	80 : ? : 125	58 : ? : 105
Distance between sub-basal setae ...	31 : c.62	c.25 : 62

Tube:		
Length (and breadth at base and near tip)	350 (88 : 55)	325 (77 : ?38)
Length of terminal hairs	225	225
Abdominal bristles on 7, 8 and 9 ...	262 : 170 : 350	194 : 125-150 : 288-300

TYPE: One ♀ in Baltic Amber, Koenigsberg Coll., XIII, B. 980.

Liotrichothrips discrepans sp. n.

♀. Length about 2.1 mm.

This is a smaller form, unfortunately embedded in a badly-disturbed and discoloured area. Parts, however, can be carefully measured, and, as they show important differences, the form can only be regarded as a third species.

It has the head noticeably, though not so strongly, convergent posteriorly as in *hystrix*, but much shorter than in that species—225 (275) μ—and slightly shorter than in *antiquus*, whilst the genal setae are short as in *antiquus* (c. 25-32 μ). The postero-angular pronotal bristles are the same length as in *antiquus* (c.100 μ), but apparently stouter, whilst the antero-angulars are obviously short (? c.40).

The tube, which is reddish in its basal two-thirds and blackish-brown distally, is shorter than in either of the other species and relatively stouter, being 288 (c.88 : c.56) μ. The terminal hairs are apparently only c.165 μ and the abdominal bristles on segment 9 about 215 μ in length. The wings are not so strong—1060 (112) μ—whilst the antennal joints 3 and 4 are subequal (as in other species) and about 100 μ in length.

TYPE: One ♀ in Baltic Amber, Koenigsberg coll., 1B.432.

Trichothrips minutatim sp. n.

♂. Length 1.1 mm.

A slight, pale species, having all the antennal joints free as in *T. angusticeps* Hood, *T. flavicauda* Morgan, etc.

The specimen is well displayed, cleared in the process of preservation as though cleared in potash; the wings, apparently brown, are laid along the back and at about the middle turned upwards at almost a right-angle, and therefore impossible to describe; there is a disturbed cloudy area of microscopic bubbles, as though from a discharge from the tube, and a similar cloud from the wing disturbance. The tube is retracted from the first impression, so leaving a clear white space between the apex of the tube and the terminal hairs detached by this retraction. There is a large kidney-shaped lead-like 'water' mass in the abdomen. Whilst both of the antennae are perfect in form, one is 8-jointed and the other abnormally 7-jointed.

The head is very slightly longer than broad, 150 (142) μ, and the eyes occupy about 0.4 the lateral length; the cheeks behind the eyes are about as broad as across the eyes and are very slightly less broad basally; the posterior ocelli are rather large, placed well forward and contiguous to the inner margins of the eyes, whilst the anterior ocellus is overhanging and forwardly directed. The postoculars are apparently short and slender, but impossible to detect and measure with exactitude, whilst they are set well back, being about 25 μ distant from the posterior margin of the eye. The antennae are twice as long as the head, and each succeeding joint diminishes noticeably in width from the fourth, the relative lengths (and breadths) of the joints from joint 3 being as follows:—

Right, 8-jointed: 42.5 (30), 45 (31), 42.5 (27.5), 40 (22.5), 39 (19), 42.5 (11) μ.

Left, 7-jointed : 42.5 (32.5), 47.5 (35), 42.5 (27.5), 45 (20), 50 (12) μ.
Joints 3 and 4 are short and broadly clavate, 5 less broadly clavate, 6 inclined to be elongate-ovate, 7 fusiform and 8 narrowly fusiform.

The pronotum, 112 (200) μ, is 0.75 the length of the head and evenly broadened to near base; the pronotal setae, of which only the postero-angulars are discernible, are moderately long, slender and pointed, the postero-angulars being 58 μ in length, or approximately 0.5 the length of the pronotum. The fore-coxal setae are comparatively long (44 μ) and the legs somewhat stout, the length (and breadth) of the femora and tibiae being approximately :—

I, 138 (70), 75 (31) ; II, 100 (44), 75 (30) ; and III, 125 (50), ? 112 (?).
The pterothorax is c.260 μ in breadth, whilst the abdomen, which gradually narrows to tube, is c.250 μ in breadth near base.

The tube is 0.66 the length of the head, the length (and breadth at base and at apex) being 100 (50 : 32) μ ; the terminal hairs are difficult to discern, but are apparently about 125 μ in length, whilst the lateral abdominal bristles are longish, those on segments 6-9 being approximately 62, 88, 38 and c.62 μ in length.

TYPE : One ♀ in Baltic Amber, Koenigsberg coll., xB2387.

March 11th, 1929.

ATHETA (HOMALOTA) SPARRE-SCHNEIDERI MUNST. IN HANTS.: AN ADDITION TO THE BRITISH FAUNA.

BY P. HARWOOD, F.E.S.

A. (*Dimetrota*) *sparre-schneideri* n. sp.—Nitidula, nigra, elytris, tibiis tarsisque nigropiceis. Capite circa 4/5 prothoracis latitudine, sparsim subtiliterque punctato; genis marginatis; oculis temporum longitudine. Antennis apicem versus leviter incrassatis; articulo 3-2 aequali, 6-10 modice transversis, ultimo obovato, 9 et 10 simul sumptis aequilongo. Prothorace antrorsum paullo angustato, transverso (long. : lat. = 1.0 : 1.4); quam capite subtilius et paullo densius punctato; basi praesertim in ♂ foveolato; lateribus vix setoso. Elytris prothorace paene 1½ longioribus; quam hoc paullo fortius punctatis; apice ad angulos posticos vix sinuatis. Abdomine apicem versus leviter angustato; tergitibus 3-5 quam in elytris parcius et paullo fortius, apice subtiliter et adhuc parcius punctato; tergitibus lineis microscopicis reticulatis. Tibiis vix setosis.

♂, capite medio foveolato; tergiti 8 rotundato, crenulato, angulis posticis sine dente majore; sterniti 6 paullum producto, rotundato; antennis articulis 4 primis villosulis.

Long. 2.2—2.6 mm.

Circa 20 expl. e Norvegia praesertim boreali. Species haec ab congeneribus punctura subtili prothoracis, microsculptura tergitium notisque maris in tergiti 8 optime distinguenda. Ab *A. procera* KR., cui his notis affinis, colore obscuriore, forma corporis robustiore, praecipueque prothorace latiore (long. : lat. in *sparre-schneideri* 1.0 : 1.4, in *procera* 1.0 : 1.2) et elytris multo densius et fortius punctatis distincta.

Hanc speciem memoriae amici defuncti H. J. Sparre-Schneider, exploratoris infatigabilis faunae entomologicae Norvegiae arcticae dedicavi.

Jeg har tat denne art ved sikining uten at ha vaeret specielt opmerksom paa under hvilke forhold, men antagelig paa fuktige steder,[1] under raatten lev etc. Jeg har fundet et enkelt eksemplar under oversvommelse[2] ved Bergset saeter i

[1] *i. e.*: chiefly in damp places, under decaying leaves, etc.
[2] *i. e.*: in flood refuse.

O. Slidre medio august 1897, ellers kun i det arktiske Norge : Storjord i Saltdalen juni 1909, Sortland i Vesteraalen juli 1920, talrig ved Bjerkeng i Maalselvdalen juni 1907, samt ved Neiden, strand og Graense-Jakobselv i Syd-Varanger.

[From 'Norsk Entomologisk Tidsskrift,' I, p. 207 (1922).]

The heavy rains of late October, 1928, caused the usual floods in the neighbourhood of Christchurch, and from a sack of siftings collected on the 27th of that month, I captured a single specimen of an *Atheta*, which from first sight I felt convinced was a species new to our lists.

I accordingly sent the specimen to Col. Deville, through my friend, Mr. B. S. Williams, who was sending some queries to him at the time, and I quote the Colonel's opinion as follows : 'As regards the black *Atheta*, I think it is a ♀ of the almost unknown *A.* (*Dimetrota*) *sparre-schneideri* Thos. Munst.'

I have since sent it to Bergmester Thos. Munster, of Oslo, who writes : 'I think also it is *A. sparre-schneideri*, perhaps slight differences in microsculpture.'

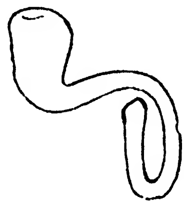


Fig. 1. Spermatheca of *Atheta sparre-schneideri* ♀.

Col. Deville was good enough to send me a typescript of the original description, of which the foregoing is a copy, and I am greatly indebted to him and to Bergmester Munster for their help in naming this species; I must also express my thanks to Mr. Williams for the camera-lucida figure of the female spermatheca.

Bournemouth.
April 15th, 1929.

BRACHYPTEROLUS (HETEROSTOMUS) VESTITUS Kiesenwetter, IN BRITAIN.

BY J. C. F. FRYER, M.A., F.E.S.

For some years past Mr. F. R. Petherbridge of Cambridge has noticed that the Antirrhinum plants in his garden have been damaged by a small beetle which he was informed, incorrectly, was *B. gravidus*. In May 1928 a number of specimens were re-

ceived from Mr. Petherbridge, and were provisionally determined as *B. vestitus* Kies., the identification being kindly confirmed by Mr. Blair at the British Museum (Natural History). *B. vestitus* is allied to *B. gravidus* but may easily be distinguished *inter alia* by its evidently larger size. In the *B. vestitus* from Cambridge the smallest example is approximately 3 mm. in length, while the average size is about 3.25 mm., whereas in a series of *B. gravidus* in Mr. B. S. Williams' collection the largest individual is but little over 2·5 mm., and the average size about 2 mm. Another evident difference is that the pubescence in *B. vestitus* is long, abundant, and of a golden brown colour, whereas in *B. gravidus* it is short, greyish, and rather scanty. Ganglbauer (Käfer von Mitteleuropa, p. 455) states that the upper side of *B. vestitus* is 'somewhat shining' and that of *gravidus* 'nearly dull,' but in the two series mentioned above this distinction does not hold, *gravidus* on account of its sparse pubescence appearing as much the more shining of the two.

B. vestitus is a South European (West Mediterranean) species which has presumably been introduced into England by chance, possibly in the packing around the roots of plants, and it has evidently found conditions in Cambridge sufficiently congenial to allow of the establishment of a colony. It is not by any means a desirable introduction as it causes considerable damage to the flowers of the Antirrhinum. An account of this injury is given by G. Tempère in the 'Revue de Zoologie Agricole,' 1926, No. 10, p. 153, in which he records the discovery of the beetle as a troublesome pest of the garden Antirrhinum in the region of Bordeaux. Apparently both in the adult and larval stages the insect feeds upon the flowers, burrowing through the corolla and eating the anthers and the pistil, thus causing somewhat the same damage as is done to the flowers of Crucifers by species of *Meligethes*. According to Perris, the pupal stage is passed in the soil (Larve des Coleoptères, 1877, p. 35).

It is interesting to find that even in the Bordeaux neighbourhood the beetle was apparently confined to garden Antirrhinum, no individuals being taken on wild species of *Linaria*. Possibly if a search were made on Antirrhinum plants in England at the time when they are coming into flower, *B. vestitus* might be found to be more generally distributed than is at present known.

Harpenden, Herts.
April 7th, 1929.

NOTE ON *ANTHOCORIS NEMORUM* L. (HEMIPTERA-ANTHOCORIDAE).

BY W. STEER.

During the course of investigations on the fauna of *Rubus* plants, begun at East Malling Research Station in August 1927, opportunities arose of making notes on the habits of *Anthocoris nemorum* L. (*sylvestris* L.), which was exceedingly common on raspberries, loganberries, and other species of *Rubus*.

This insect, in common with other Anthocorids, is markedly predaceous, and on various occasions was observed to attack most of the small Hemipterous species found on *Rubus*. These included the Aphid *Amphorophora rubi* Kalt., and the Jassids *Typhlocyba tenerrima* H.-S., *T. ulmi* L., *T. ?douglasi* Edw., and *Empoasca* (*Chlorita*) *flavescens* Fall. Nymphs and adults of *A. nemorum* were also observed to feed upon the red spiders *Tetranychus telarius* L. and *Oligonychus ulmi* Koch, both of which occur on *Rubus*, and on the eggs of these mites.

On occasions individuals will attack other individuals of their own species. The method adopted can be watched in detail by enclosing a number of the bugs in a glass topped collecting tin, when both nymphs and adults will readily turn cannibal. One individual will get upon the back of another, and, holding its victim firmly with all six legs, will manoeuvre its proboscis until it is able to insert its stylets into one of the victim's coxae. It will then maintain this position tenaciously, although dragged about by its victim. The latter sometimes manages to free itself and may even turn the tables on its aggressor. If it escapes quickly it is apparently unhurt. More often it is rendered lame in one or more legs, and a drop of colourless fluid is seen to exude from each wound. Often the victim dies. This method of attack is sometimes adopted in attacking leaf-hoppers and immature Capsids. When attacking such insects as Aphids and mites, the bug carries its proboscis held out in front of its head and plunges it into the nearest point of the body of its prey.

Red spiders (Tetranychidae) are readily preyed upon; under a binocular microscope the bugs, especially the nymphs, may be watched systematically searching a leaf for red spiders and their eggs. A nymph will walk the length of a vein with proboscis extended and carefully probe either side of the vein, where the mites and their eggs are most numerous, and suck dry those it finds. Indeed the bug often lays its eggs where there is an abundance of red spider. Some plum leaves badly attacked by *Oligonychus ulmi*

were examined in August, 1928, and several Anthocorid eggs were found, laid singly and partially imbedded in the lower epidermis of the leaf. These proved on hatching to be eggs of *A. nemorum*, and the newly hatched nymphs soon began to wander over the undersides of the leaves in search of mites and eggs.

A. nemorum is usually common on all kinds of fruit-trees and bushes where it feeds on various Aphids, leafhoppers, etc., in addition to *Oligonychus*, and on hops where hop-feeding Aphids and *Tetranychus telarius* appear to form its main diet.

There are apparently several successive generations during the year, since all the nymphal instars and adults exist contemporaneously throughout the summer. The bug appears to hibernate in the adult stage only, chiefly under moss and loose bark, in crevices, and in rubbish on the ground.

Wherever tar-distillate washes (the so-called 'carbolineum' washes) are used as dormant winter-sprays for fruit-trees, red spider (*Oligonychus ulmi*) increases in numbers and rapidly becomes an important pest. A contributing factor to this increase may be the effect of the washes on this bug. The washes remove loose bark and moss etc. from the trees, and thus reduce the available winter shelter. Large numbers of the bugs might also be killed whilst hibernating under bark, in crevices of the trunks and branches, in cracks in the supporting stakes, and under dead leaves etc. around the trees.. Incidentally these washes, though of great ovicidal value against many pests, do not seriously affect the eggs of *Oligonychus ulmi*. In old neglected orchards where winter spraying is not practised, *A. nemorum* and other Anthocorids and predaceous Capsids usually occur in far greater numbers than in well kept, regularly sprayed plantations. Conversely, red spider is usually less prevalent in neglected orchards.

East Malling Research Station.
February 25th, 1928.

NEW SPECIES OF PSOCOPTERA FROM WAREHOUSES.

BY J. V. PEARMAN, F.E.S.

From Mr. O. W. Richards, M.A., of the Department of Entomology, Imperial College of Science and Technology, and from Mr. H. Britten, of the Manchester University Museum, I have received for determination some Psocids which may, not improbably, have been introduced into this country from West Africa and the West Indies respectively. Mr. Richards' insects were taken during his investigations into the pests of stored products

in London import warehouses; Mr. Britten's was found in a store at Manchester. They comprise the three forms here described.

1. CHAETOPSOCUS n.g.

Genotype: *C. richardsi* n. sp.

Female with small eyes, set well below postocular angle of head, with reduced meso- and meta-thorax, and with greatly reduced wings. (Male unknown.)

Antennae probably thirteen-segmented (defective). Mouth parts much as in *Trichopsocus*. On hind head margin near each post-ocular angle a very long bristle. Forewings with bristly cilia along margin (except below axillary cell) and along veins (except analis*), hindwings bare. Femora of first pair of legs a little widened. Tibial end-spurs 2, 2, 3. Tarsi two-segmented. Claw without pre-apical tooth.

Apparently allied to *Trichopsocus*. Apart from the reduced wings and venation of the female, differs from that genus particularly in the form of the pair of specialised postero-lateral occipital bristles (which in *Trichopsocus* are relatively shorter, widened and cleft at the tip), in the number of tibial end-spurs (in *Trichopsocus* 2, 4, 4), and in the details of the abdominal appendages.

Chaetopsocus richardsi n. sp. (Fig. 1 *a—d*.)

Colour (in alcohol): Head dark brown tending to black, labrum paler, yellowish brown. Eyes black. Ocelli pale. Palpi brown. Antennae yellow. Thorax brown, lighter than head, notal divisions outlined darker. Abdomen brownish-yellow, apex and genitalia brown. Legs yellow. Forewings faintly tinged greyish-brown, veins and cilia brown, marked with four elongate brown spots occupying the radial cell and the three apical cells between *r1* and *cu*. Hindwings hyaline with brown veins (in the right wing, a brown spot distally of the radio-median crossvein).

Morphological: *Head* relatively large, hind margin lightly curved, epicranial suture distinct, frontal sutures obsolete; clypeus large, its anterior edge wide and straight, slightly tumid; eyes small, hemispherical; ocelli flattish, in a nearly equilateral triangle and separated by about twice the individual diameter; antennae about half as long as the whole insect (only twelve segments of one antenna remain, proportions of flagellar segments 4, 2, 3, $1\frac{1}{2}$, $1\frac{1}{3}$, $1\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{4}$, $1\frac{1}{4}$, $1\frac{3}{8}$), flagellum moderately thickly beset with semi-erect cilia which are about twice as long as the flagellar diameter; maxillary palpi with sub-cylindrical end segment with flatly rounded apex. The whole head beset with bristly cilia, mingled shorter and longer, mostly with raised insertion sockets, some long bristles with large sockets along hind margin, of which one each side is noticeably longer (·075 mm.).

Thorax about three-quarters as wide as head. Prothorax of form usual in winged Psocids; mesothorax with reduced notal divisions, humeral angles of dorsum rather acute, scutellum proportionally large; metanotum simple, only the scutellum distinct. Mesonotum with mingled shorter and longer cilia (as on head), and four longer bristles, *viz.* one at each humeral angle and one at the base of each dorsal lobe near the scutellum; pronotum with only two moderately long bristles on the disc; metanotum bare.

* Enderlein's terminology.

Abdomen large, rounded, the basal segment bare, the tergites of the other segments each with close-set, minute microtrichia and a median transverse row of cilia. Median telson lobe with a few long cilia; lateral telson lobes each with two approximated stumpy spines apically and a sense-field of four to five trichobothria basally above, a row of long cilia on outer edge, and shorter hairs on inner edge beneath. Gonopod of segment VIII ribbon-like with pointed end; gonopod of segment IX composed of a firm, oval, outer lobe with long bristles, and a delicate, transparent, broad, flat, bristle-less inner lobe apically pointed. Sub-genital plate with broadly truncate apex bearing a row of nine cilia.

Wings (fig. 1*b*) very small, membrane with rather coarse microtrichia, veins broad (except analis). Forewings with large simple pterostigma, the stigma-sac well developed; *rr*, *m* and *cu* simple, unforked; *rr* and *m* meeting in a point; *an* and *ax* meeting on hind margin. Margin, except below cell *AX*, and all veins, except analis, with spaced long cilia. Hindwings with incomplete venation, not ciliated.

Legs stout, anterior femora somewhat widened; hind coxae with complete 'stridulatory' apparatus; hind tarsal proportions 1⅔ : 1; claws without pre-apical tooth, empodium with expansible apex; all femora with scattered cilia and a row of longer cilia along inner edge, all tibiae with rows of strong cilia set among microtrichia and some weak spines along outer edge, tarsal segments with strong microtrichia and a few cilia; no ctenidia, but tibial spines with simple scale-like basal processes.

Lengths: Insect (in alcohol) 1.3 mm., forewing 0.4 mm.

Nymph (last instar) with short wing rudiments, unicolorous pale yellowish, differing slightly from the imago in the details of ciliation, *viz.* the occipital bristles relatively shorter, meta-thorax with a few long cilia, and the inferior wing-pads having one or two cilia on the hind margin.

LONDON: Metropolitan Wharf, among West African cacao, 4-v-1928, one ♀, one nymph (O. W. Richards). Probably introduced.

Type (dissected) in my collection.

Dedicated, with acknowledgements, to its discoverer.

2. *Liposcelis virgulatus* n. sp. (Fig. 2 *a*—*b*.)

Colour (in alcohol) generally pale yellowish, head and thorax of a somewhat deeper tint, palpi nearly colourless, antennae light greyish-brown, eyes black. Marked with brown as follows: at each side of head, inward of and extending from base of antennae to eye an outwardly-pointing V-shaped mark; a fine line edging antedorsum of prothorax; a streak down each side of meso-metanotum; broad transverse banding along the hind margins of the third and fourth, and the anterior margins of the fifth to tenth abdominal tergites, these bands more or less interrupted in the middle line. The markings are composed of congested small spots and the abdominal banding of similar spots on a tinted ground; their intensity varies somewhat individually.

Morphological: Eyes with eight ommatidia. Hind femora with the sub-basal external projection small and pointed, the indentation behind it shallow. Chaetotaxy of thoracic sternites somewhat variable, the normal being—on prosternum, six bristles in the anterior half arranged in a forwardly convex curve; on meso-metasternum, a row of 10 bristles. (Of nine examples examined for these characters, five were as described, one had 5 prosternal and 9 mesosternal bristles, two had 6+9, and one 6+11.)

Epidermal sculpture and ciliation much as in *L. divinatorius*, but rather coarser.

Length (in alcohol) 1.3—1.4 mm.

ENGLAND: London, Metropolitan Wharf, among West African cacao, 4-v-1928, 15 ♀♀, 4 nymphs (O. W. Richards). Possibly introduced.

Holotype and paratypes in British Museum. Paratypes also in Ent. Dept., Imp. Coll. Sci., and in my collection.

There is a possibility that this insect may be only a geographical race of *L. transvaalensis* Endln., 1909. The latter, described from a single example, is however without the very distinct brown marks and bands, but otherwise agrees very well. In colour and markings two other species, *L. entomophilus* Endln. 1907 and *L. bakeri* Pearm. 1928, superficially resemble *virgulatus*, but differ in the chaetotaxy of the thoracic sternites and other details; moreover, neither has the apparently characteristic v-shaped marks near the antennal toruli.

3. RHYOPSOCOPSIS n.g.

Genotype: *R. peregrinus* n. sp.

Head large. Eyes very large, posteriorly reaching hind head margin. Ocelli separated. Clypeus moderate, tumid. Maxillary palpi with securiform apical segment. Prothorax free, large, lamellar. Mesothorax with raised cordiform dorsum embracing the large sub-hemispherical ante-dorsum. Abdomen long-ovate. Forewings oblong-elliptical with well-developed anal lobe; venation of type similar to that of *Deipnopsocus* Endln., veins (except analis) and margin (except at anal lobe) with bristly cilia. Femora of all legs somewhat expanded. Tarsi of three segments. Claw without pre-apical tooth.

Allied to *Rhyopsocus* Hagen, 1876, and *Deipnopsocus* Endln., 1903. Differs from those genera by the sharply defined angulated anal lobe of the relatively longer forewings, by certain venational minutiae and by other minor structural details. The differences between the three allied forms are, however, so slight that they may be only specific, in which case all the species would be referable to the genus *Rhyopsocus*.

Rhyopsocopsis peregrinus n. sp. (Fig. 3*a*—*b*.)

Colour (dry): Heading shining black, clypeus and labrum brown-black. Eyes black. Palpi creamy, end segment edged brownish. Antennal basal segments (scape and pedicel) creamy yellow (remainder wanting). Prothorax and mesothorax shining black, metathorax brown-black. Abdomen yellowish with brown suffusions. Legs yellow. Forewings transparent, tinged brownish between *r1* and posterior margin (except a triangular basal area bounded approximately by the basal portion of *r1* by the vena analis, and by an oblique line passing through the point of departure of *m3*); a brown spot between base of pterostigma (stigmasac) and *rr*; anal lobe dark brown posteriorly, colourless in anterior third; venation fine, margined brown; cilia brown, their sockets margined brown. Hindwings glass-clear, venation dark grey.

Morphological: The head has collapsed in drying. Ocelli not easily seen, apparently not large, equidistant at about twice their diameter. Of the antennae

only the two basal segments remain. The maxillary palpi rather long, the end segment large. The whole head bears a few scattered hairs, longer near eyes, especially posteriorly; eyes bare.

Prothorax about as wide as head between eyes, deep and plate-like, the anterior half concealed beneath head and the posterior edge resting on the mesothorax. Mesothorax differs from that of the generality of winged Psocids, the dorsum forming a raised cordiform plate having a large, central, shallow circular depression which is occupied by the large sub-hemispherical antedorsum (these parts have a few scattered punctures); antero-lateral angles of dorsum each produced into a humeral boss; below the dorsal plate the sides of mesothorax are rather deeply excavated; hind margin rib-like and produced at each side into a small but strong blade-like pointed projection; scutellum indistinct. Metathorax small, set somewhat vertically, with two well-developed side pieces and two smaller median pieces.

Abdomen narrowly long-oval with a few fine scattered whitish short hairs and some longer ones at apex.

Forewings reaching beyond end of abdomen, the anal lobe strongly angulate posteriorly and separated from the rest of the wing by a fine oblique vein (analis), posterior wing margin sensibly excised at the end of the vena analis; pterostigma about half as long as wing, the veinlet closing it (distal section of *sc*) delicate and running obliquely forward; basal section of *sc* short but strong, running obliquely to anterior margin; radial sector not distinctly connected to base of pterostigma; *m3* arising behind and distant from stem of *m1* and *m2*; *cu* long, sinuous, the hinder branch not apparent but its course marked by a row of bristles; marginal vein continued round anal lobe, beset with tiny scales as in *Deipnopsocus*. Marginal vein (except round anal lobe) and other veins (except analis) with spaced bristly cilia, some of which are set in the membrane beside the veins; a row of bristles runs round wing parallel with margin, another row runs beside the indicated hinder branch of *cu*, and a third row close behind analis; all cilia approximately as long as width of radial cell. Hindwings as in *Deipnopsocus*; wholly bare.

Legs with a few hairs, but without spines except at ends of tibiae; tibial end-spurs rather long, but their number not ascertainable; proportions of hind tarsi about 4 : 1 : 1.

Length of insect 1 mm., of forewing 0.95 mm.

ENGLAND: Manchester, Miles Platting, in a banana store, 25-ix-1922, one example (sex not certainly determinable) (H. Hillyard). Probably introduced.

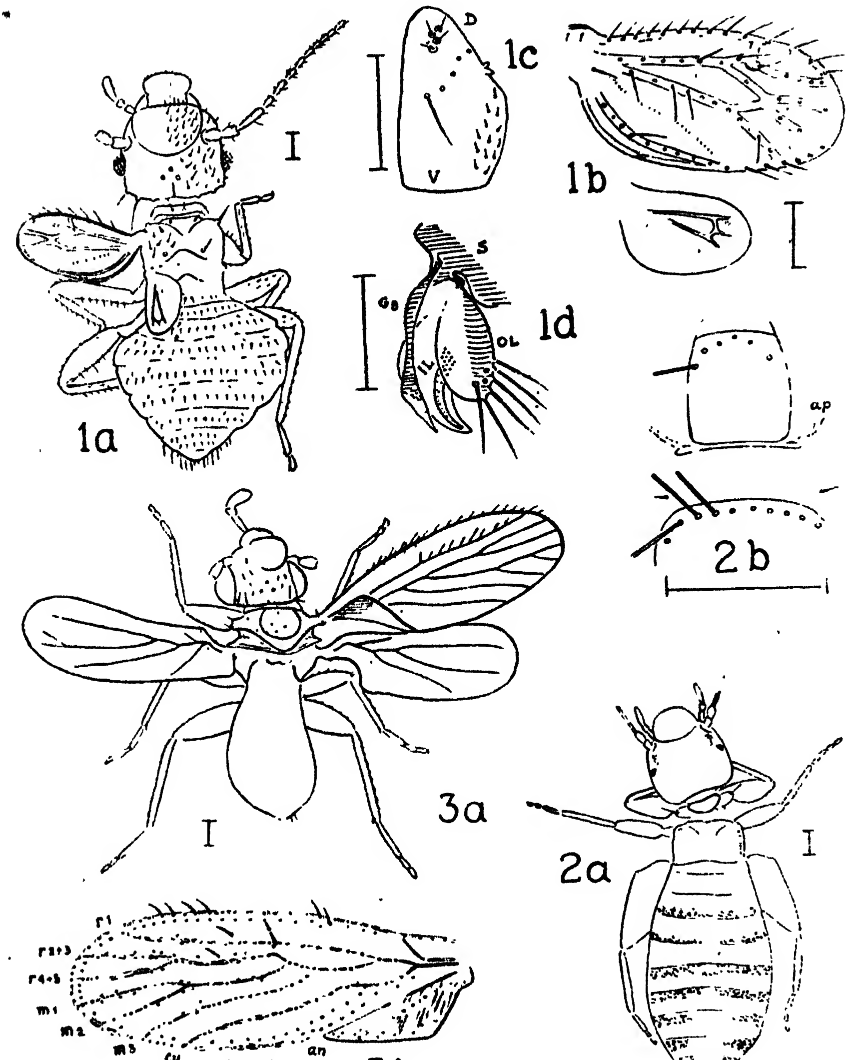
Holotype (dry, carded) in Manchester Univ. Mus. It is understood that later it will be deposited in the British Museum.

Of the two allied species known, *Deipnopsocus spheciophilus* Endln., 1903, Peru, is paler coloured, and has rather shorter wings with a rounded undifferentiated anal area, and with shorter and wider radial and median forkings. The other, *Rhyopsocus eclipticus* Hag., 1876, Kerguelen, has wings shorter than the abdomen, with a smaller, less angulated anal lobe; the venation is aberrant. The wing cilia are slightly longer in comparison and rather less numerous, there being only four along the upper boundary of the radial cell and ten beyond it along *rs* and *r 2 + 3*, as against six and thirteen in *R. peregrinus*. For a comparison and figure of

the wing characters of *R. eclipticus* I am indebted to Mr. Nathan Banks, of the Harvard Museum of Comparative Zoology.

32 Cornwallis Crescent, Clifton, Bristol.

April 8th, 1929.



EXPLANATION OF FIGURES.

1*a*. *Chaetopsocus richardsi* n. g. n. sp. ♀ ; 1*b* the same, wings ; 1*c* the same, left telson lobe flattened,—D dorsal, V ventral surface ; 1*d* the same, gonapophyses,—S amalgamated sternites, G8 gonopod of segment VIII, OL outer, IL inner, lobes of gonopod of segment IX ; 2*a* *Liposcelis virgulatus* n. sp. ♀ ; 2*b* the same, part of thoracic sternites ; 3*a* *Rhyopsocopsis peregrinus* n. g., n.sp. ; 3*b* the same, left forewing.

The scale lines to each figure are equivalent = 0.1 mm.

The List of the Coleoptera of Dorset.—It is proposed shortly to issue a Second Supplement to the List of Dorset Coleoptera, which was published by the Dorset Field Club in 1926. The first supplement of additional records followed in 1927; this brought the total number of species for the county up to 2,064. Since 1927 material for the second supplement has been steadily accumulating. In order that this may be as complete and inclusive as possible, it would be an act of great kindness to the compiler if any Coleopterist could inform him on the following points:—

Since the List and the first Supplement have been published—

(1) Do you know of any additional records, published or unpublished?

(2) Have you any records yourself (either by way of additional species or localities, etc.) which you wish to be included in the proposed second supplement?

(3) Do you know of any collector, or of any information or material, likely to be useful to the compiler?

Any information on any of these points should be sent as soon as possible to REV. E. J. PEARCE, 18 Milton Road, Swindon, Wilts.

Stenus opticus, Haltica lythri and other Irish Coleoptera.—The following Coleoptera are mostly new county records, and two are apparently new to the Irish fauna, i.e. *Stenus opticus* Grav. and *Haltica lythri* Aube. Both species were taken by Mr. A. W. Stelfox, of the National Museum. Of the latter species, Johnson and Halbert in the Irish list (Proc. R.I. Acad. 1902, p. 769) say: 'Doubtful as an Irish species. The record *H. erucae* (85 H.) was very probably founded on a specimen of *H. ericeti* All., to which species the record Queenstown ('95 Wr.) is to be referred.'

Brychius glabratus Villa (*elevatus* Pz.). Occurred in the Rye Water, Leixlip, Co. Kildare. I obtained half a dozen examples by placing my net in an upright position and then stirring up the stones up-stream. *Hydroporus* (*Deronectes*) *griseostriatus* De G. Mr. Stelfox and I took this species at Liffey Head, Co. Wicklow, on June 3rd, 1927, occurring in company with *Agabus arcticus* Payk., *A. solieri* Aubé (two specimens), *Rhantus bistriatus* Berg. and *Ilybius aenescens* Thoms. *H. rivalis* Gyll. and *H. septentrionalis* Gyll., Clara, Co. Wicklow. I took both these species in the Avonmore; they were clinging to the weed-covered stones. *Agabus conspersus* Marsh., Kilbarrack and Baldoyle, Co. Dublin. About a dozen taken by 'sweeping' flooded grass. *A. chalconotus* Panz., Clara, Co. Wicklow. Two examples occurred in a heap of fallen leaves in the woods, close to the river. *Gyrinus minutus* F., Skerries Bog, Athy, Co. Kildare. I found this species fairly plentiful in the pools. September, 1928.

Oxypoda alternans Grav., Powerscourt, Co. Wicklow. One example by general sweeping on June 20th, 1928. *Atheta aequata* Gr. Also at Powerscourt. I took this species in fungi. *Gnypeta carbonaria* Mann. (*labilis* Er.). One specimen in moss on wall at Seatown East, Malahide, Co. Dublin. *Gyrophaena affinis* Mann. Three or four in Polyporus, Powerscourt, Co. Wicklow. *Oligota punctulata* Heer., Clontarf, Co. Dublin. One or two in moss. *Gabrius appendiculatus* Sharp, Ballinahinch, Co. Galway. Collected by Mr. Stelfox, September 1928. *Lathrobium terminatum* v. *immaculatum* Fowler, also at Ballinahinch, Co. Galway. *Stenus opticus* Grav. Taken by Mr. Stelfox at Ballinahinch, Co. Galway, on September 10th, 1928, this species is apparently not recorded from Ireland. My determination was verified by Mr. J. R. le B. Tomlin. *S. picipennis* Er. I have taken this species at Kilbarrack and Raheny, Co. Dublin. *Lesteva fontinalis* Kies., Upper Dodder, Co. Dublin. A specimen collected by Mr. T. F. Riley on November 18th, 1928.

Liodes humeralis Kug., Clara, Co. Wicklow. Collected by Mr. Stelfox. *Silpha quadripunctata* L., Clara. A specimen caught by Mr. Stelfox flying in the woods. *Choleva kirbyi* Spence. Mr. Stelfox took this species at Portmarnock, Co. Dublin, in August 1924. *Esolus* (*Elmis*) *parallelopipedus* Mull., Rye Water, Leixlip, Co. Kildare.

Denticollis (*Campylus*) *linearis* L., Powerscourt, Co. Wicklow. Both males and females taken by Mr. Stelfox. *Thanasimus formicarius* L. I captured a nice specimen on a log at Powerscourt, Co. Wicklow. *Rhizopertha dominica* Fab. (*pusilla* Fab.), Dublin. On coat of friend in tram.

Phyllobrotica quadrimaculata L., Clara, Co. Wicklow. Mr. Stelfox took about a dozen examples on July 27th, 1927. *Galerucella nymphaeae* L., Leixlip, Co. Kildare. *Galeruca* (*Adimonia*) *tanaceti* L. On road, Skerries Bog, Athy, Co. Kildare. *Haltica lythri* Aubé, Camphire, Co. Waterford. Taken by Mr. Stelfox, August 15th, 1928. Mr. Halbert agrees with my determination. *Phytobius canaliculatus* Fab., Lough Callow, Co. Galway. Mr. Stelfox, September, 1928.

Ischnomera sanguinicollis F., Powerscourt, Co. Wicklow. Taken by Mr. Stelfox. *Orchesia* (*Clinocara*) *undulata* Kr. A specimen was taken by Mr. Stelfox on fungi on a felled log in the Deerpark, Powerscourt, Co. Wicklow. *Melandrya caraboides* L. This species is fairly plentiful in the Deerpark, Powerscourt. Mr. Stelfox and I took it in some numbers on logs on June 20th, 1928.—Eugene O'Mahony, National Museum, Dublin : *April*, 1929.

Hemiptera in the East Midlands, 1928.—Heteroptera : *Palomena prasina* L. Plentiful at Linwood, near Market Rasen, Lincolnshire, during August. *Piesma maculata* (*capitata*) Wolf. Found in sugar-beet field at Rolleston, Notts, during June. *Salda saltatoria* L. At Weston-on-Trent, Derbyshire, in June. *Anthocoris sylvestris* L. At Exton, in Rutland, in July. Common over the area. Appears to feed on Aphids on Chrysanthemums until they cease to reproduce. It then appears to damage the buds in the late autumn. *Stenodema laevigatum*. Near Derby, Oakham and Shoby, Leicestershire, in June. *Leptopterna dolabrata* L. Caistor (Lincs.) and Ashbourne (Derby) in August. *Calocoris bipunctatus* F. Widespread upon potatoes at Derby, Oakham and Nottingham, July and August. *Plesiocoris rugicollis* Fall. Widespread upon apples and currant bushes, June to October. *Lygus pabulinus* L. Oakham (Rutland), July. *L. pratensis* F. Ashbourne (Derby), Oakham (Rutland), and plentiful in Notts., Leics. and Lincolnshire. Damages buds on Chrysanthemums in many places in October. *Heterotoma merioptera* Scop. Kegworth (Leics.) and Locko (Derby), July. *Plagiognathus arbustorum* Fab. Very abundant on currants and raspberries in Leicestershire during the summer months.

Homoptera : *Triecphora vulnerata* Illig. A few taken at Kegworth (Leics.), July. *Aphrophora salicis* De G. At Legsby (Lincs.), plentiful, August. *Cicadula fasciifrons* Stal. At Oakham, October. *Dicraneura mollicula* Boh. Abundant apparently all the year round at Melbourne (Derbyshire) on Thyme and Sage. Causes leaf loss on Thyme and appears to cause death of the plants. *Chlorita viridula* Fall. Common in Notts., Leics., Derby, Rutland and Lincs. during August, 1928, but scarce 1927. *Eupteryx auratus* L. At Oakham, and common elsewhere on potatoes, July. *Typhlocyba rosae* L. In Kegworth (Leics.), large numbers entering the house during September. *Typhlocyba quercus* Fab. Near Matlock (Derby), August. *Zygina parvula* Boh. Kegworth (Leics.), September ; Derby, July. *Livia juncorum* Latr. Legsby (Lincs.), August.—A. Roebuck : *January 31st*, 1929.

Obituary.

The Rev. Alfred Edwin Eaton, M.A., F.E.S. died at Northam, N. Devon, on March 23rd last. The decease of this veteran Entomologist, at the ripe age of eighty-four years, removes from the list of the Entomological Society of London the name of its senior Fellow—he was elected as long ago as July 3rd, 1865—and our own Magazine sustains the loss of its oldest surviving contributor, as a note from his pen on a Trichopterous insect appears on p. 47 of our first volume. From an early age nearly all branches of Zoological science appear to have appealed to him, and in 1873 he accompanied the well-known Arctic explorer, Mr. B. Leigh Smith, on a summer cruise to Spitsbergen in the steam yacht 'Diana,' the outcome of which was a highly interesting series of observations on the birds and other forms of animal life met with during the voyage, published shortly after his return to England in the 'Zoologist.' It was this work which in all probability led to his selection in the following year as Naturalist to the British Transit of Venus Expedition to Kerguelen Island. More than four months of the southern summer—if summer it can be called in this remote 'Land of Desolation' isolated in the midst of the Great Southern Ocean—were spent here by the subject of this notice, during which extensive collections were made of the limited but most interesting plant and animal life of the Island. These collections are fully described and discussed in the special volume (168) of the Philosophical Transactions for the year 1879, in which Eaton's copious and valuable field-notes are presented in detail; and preliminary notices of the very few but most remarkable forms of insects characteristic of Kerguelen Island have appeared in our own pages (Eaton, Ent. Mo. Mag., xii, pp. 1—2; 58—61: C. O. Waterhouse, xii, pp. 54—57; xiii, pp. 51—2).

Eaton's name and reputation as an Entomologist will, however, be chiefly associated with his lifelong work on the Neuroptera (*sensu Linneano*), and especially on the 'Mayflies' now elevated to the rank of an Order. His 'Revisional Monograph of Recent Ephemeridae or Mayflies' (Linn. Soc. Trans., Zoology, 1883-7, pp. 352) remains the standard treatise on these Insects. The Neuroptera of the 'Biologia Centrali-Americana' were also dealt with by him, and his last noteworthy piece of work in this Order is on the Ephemeridae of the Seychelles (Linn. Soc. Trans., Zoology, xv, 1913, pp. 433-4). Up to quite recent years he was a frequent and highly esteemed correspondent of our Magazine, and his 'Synopsis of the British Psychodidae' which, with its extended 'Supplement,' appeared in our pages between the years 1893 and 1898, is a contribution of outstanding value to the study of our native Diptera.

His death, after a long period of failing health, leaves a notable gap in the fast-thinning ranks of our older Entomologists, and it may be long before we find a successor of equal capacity in the special department of our science to which the chief part of his life's work was devoted.

Society.

Entomological Society of London: *Wednesday, March 6th,* 1929.—Dr. K. Jordan, President, in the Chair.

The Secretary read for the second time the proposed changes in the Bye-Laws of the Society to be considered at a special meeting in April.

The President exhibited and made remarks on Satyrine butterflies from the Herzog mountains in Eastern New Guinea. Dr. S. A. Neave exhibited an early work by F. W. L. Sladen entitled 'The Humble Bee: Its Life History and How to Domesticate It,' published when a boy, which he proposed to present to

the library of the Society. Professor E. B. Poulton, F.R.S., communicated the following: (1) Observations on Malayan insects by Captain H. M. Pendlebury; (2) Resting attitudes of moths observed by Mr. C. B. Williams at Amani, Tanganyika Territory; (3) On behalf of Dr. V. G. L. Van Someren, shock-produced tails in a *cenea* female of *Papilio dardanus* (4) The late appearance of *Pieris brassicae* in 1928 on behalf of Mr. O. H. Latta; (5) Notes by Mr. J. E. M Mellor on dragonflies as enemies of tsetse flies, etc.; (6) The Uvarov theory of locust migration and its bearing on butterfly migration. Mr. W. J. Lucas exhibited and made remarks on British predaceous insects and spiders with their insect prey.

Wednesday, March 20th, 1929.—Dr. K. JORDAN, President, in the Chair.

The President announced the deaths of Mr. A. E. Wileman and Mr. S. L. Mosley, Fellows of the Society.

The following were elected Fellows of the Society: Edith May Lyall, 57 Mortlake Road, Kew Gardens, Surrey; Stewart MacLagan, B.Sc., Farnham House Laboratory, Farnham Royal; Dr. G. S. Graham-Smith, Pathological Laboratory, Medical School, Cambridge; Derek Shannon, Gothic Cottage, Four Oaks Road, Four Oaks; Major F. W. Bewsher, D.S.O., O.B.E., M.C., 2nd Batt. Devon Regiment, South Raglan Barracks, Devonport; Harry Dinnage, 30 Stable Cottages, Lower Beeding, Horsham; Botha de Meillon, The South African Institute for Medical Research, Johannesburg, South Africa; Harold W. Daltry, Bar Hill, Madeley; Ian R. P. Heslop, B.A., 34 Henleaze Gardens, Westbury-on-Trym, Bristol; Harold Cecil Kenway, 179 Brook Street, Brooklyn, Pretoria; Herbert Ellis Norris, 15 Market Place, Cirencester; Hugh Parry Jones, Natural History Museum, Wollaton Hall, Nottingham.

The Secretary read for the third time the proposed changes in the Bye-Laws of the Society to be considered at a special meeting in April.

Professor E. B. Poulton, F.R.S., communicated the following: (1) Notes on the larva of *Papilio dardanus* in Uganda, by Mr. and Mrs. W. C. Simmons; (2) On behalf of Mr. C. L. Collenette, a photograph of Pierine butterflies settled on the ground in Brazil; (3) Notes on butterfly migration in East Africa, by Dr. W. A. Lamborn and Canon Rogers; (4) An Aegeriid moth mimicking an Ichneumonid from Jinja, Uganda; (5) A predaceous Asilid with its Pierine prey, taken by Mr. C. L. Collenette in Brazil; (6) British Asilidae and their prey observed by Mr. H. W. Andrews; (7) A Longicorn beetle believed in Ashanti to promote human fertility; (8) The Tabanid fly, *Pangonia longirostris*, attacking man in the Central Himalayas. Captain A. R. Hemming exhibited a new sub-species of *Zegris eupheme* Esp.—S. A. NEAVE, *Hon. Sec.*

OBSERVATIONS AND RECORDS FOR SOME THYSANOPTERA FROM GREAT BRITAIN. V.—*PHYSOTHRIPS* SPP.

BY GUY D. MORISON, PH.D., M.SC. (LOND.),

North of Scotland College of Agriculture, Aberdeen, N.B.

In spite of the artificiality of the genus *Physothrips* Karny, I retain the name for the present to include a number of species in the *Taeniothrips*-complex. Authors at various times have pointed out the great similarity existing between the adults in the *Thrips* and the *Taeniothrips* complexes (*sens. lat.*), and recently Priesner

(Die Thysan. Eur. 1926-28) has emphasised this fact after surveying all known instars of European Thysanoptera. Excluding specific characters the only distinction between adult *Physothrips* and *Thrips* is that the former have one more segment than the latter at the end of each antenna. However, this character is not constant, for it is not uncommon to find specimens of *Physothrips* minus the terminal segment or specimens of *Thrips* with an additional terminal segment. Basing my remarks on observations made during the last six years on *P. vulgatissimus, P. atratus* and *T. tabaci, T. fuscipennis, T. flavus* et spp., I find the two genera very similar in habits and in the plants they frequent. In the southern counties of England I found *Thrips* predominating over all other genera on most wild and cultivated flowering plants. The predominance was both in numbers of species and in individuals, whilst *Physothrips* was comparatively scarce. In N.E. Scotland *Physothrips* occurs in multitudes of individuals on most wild or cultivated flowering plants, whilst *Thrips* is much scarcer. In fact, though *Thrips* is quite common in species in the North, I have never found large crowds of individuals on plants as in the South. The same species of *Thrips, Physothrips* and plants occur together in the North and South. The reason why certain species of one genus are more numerous in individuals in the north than in the south, needs further investigation. The influence may be climate, since soil conditions seem too alike in the two regions to have much effect.

Physothrips vulgatissimus (Hal.).

Life-history : In N.E. Scotland females emerge from hibernation and invade the catkins of sallow (*Salix Caprea*) when this plant starts flowering and opening its leaf-buds early in April. The common and widely distributed sallow is the first plant to flower. As soon as other plants start opening their leaf-buds or flowers, they too are invaded by the thrips. I have found *vulgatissimus* on 102 species of wild plants, but it particularly favours *Salix* in the spring and Umbelliferae later in the year. The females appearing in spring are dark individuals which become ovigerous during May and oviposit in the catkins of sallow. The bright yellow nymphs appear at the end of May. Moving rather slowly they live and feed between the seeds of the catkins or on the undersurface of the leaves. Often they are so numerous that they cause a considerable bleaching of the under surface of the leaves. Towards the end of June they reach the end of their second stadium and they pass to the earth to complete their metamopho-

sis. Amongst the full grown second instar nymphs the females are larger and usually darker yellow than the males, but these are all the sexual distinctions I have noticed even in mounted specimens. Females and males occur in about equal numbers amongst the nymphs. I do not know how prepupae and pupae of both sexes behave in the field but under observational conditions they are negatively heliotropic and markedly gregarious. They can walk slowly and they are able to regain their feet if turned on their backs on a flat surface. The nymphal, prepupal and pupal cuticles are shed in the way usual to insects. The prepupal period lasts 3 days, the pupal 4-5 days for both sexes. The bright red eyes are conspicuous in the yellow, more or less translucent body of the prepupa and the young pupa. The first generation of adults emerges during early July. On first emerging the insects are bright yellow, but they become dark in a few hours or after 2-3 days depending on, in part at least, the intensity of the light to which they are subjected. Both sexes can jump about 1 cm. distance, and in warm weather they are active fliers readily taking to wing, usually as the sequence of a jump. Whilst bright sunshine combined with warmth makes them most active, they seem to avoid long exposure to the direct rays of the sun. They congregate in large numbers on the flowers of most plants. A single small plant of *Heracleum Sphondylium* often harbours about 1,000 imagines amongst the flowers of its 3-4 umbels in July, yet the insects are almost invisible on flowers exposed to sunshine, and a cloudy day is needed for them to appear like a sprinkling of black pepper on the flowers of *Matricaria* or *Achillea* or in the bells of *Campanula*. The male is more active than the female and copulation is frequent in the flowers. Both sexes may occur together in about equal numbers on plants, or one sex may be much more numerous than the other on a particular plant irrespective of its species. Night and wet weather is passed by the insects sheltered amongst flowers. Their most potent enemy is a red mite which becomes common on many flowers in July.

During July the first generation of adults gives rise to the second generation of nymphs. These feed on the larger species of Umbellifers of which *Heracleum Sphondylium, Conium maculatum, Angelica sylvestris, Chaerophyllum sylvestre, Anthriscus sylvestris, Aegopodium Podagraria, Ligusticum scoticum* may be mentioned Sallow is not favoured since it is flowerless with leaves now tough and usually mildewed. The habits of the immature instars and the duration of the prepupal and pupal stadia

are the same as those of the first generation. The adults of both sexes of the second generation appear during the latter half of September and they are numerous on Composites and other flowers till the end of October. Probably all the males die during October-November, and the fertilised females survive to start a new generation in the following year on sallow. I have found hibernating females during the winter months, but never males which only appear after the first generation of nymphs has matured. The females endure a hard frost in the open both in spring and in late autumn.

On *Heracleum* nymphs feed on the seeds and in the grooves of the stem and leaf stalks, but very little on the leaves. They are often so numerous as to be clustered together like aphids, only they are more active. Their damage to the plant is often quite conspicuously evidenced by parts of the plant being silvery instead of green. Aphids may occur on the same plant, but not on the same umbel as the thrips. Aphids soil the plant with their cast skins and excrement and they attract ants which cluster in the swollen axils of the leaves. The nymphs and adults of *vulgatissimus* do not soil the plant.

Sallow and Umbellifers are most favoured host-plants, but nymphs occur scattered on *Ulmus montana, Cytisus Scoparius, Spirea Ulmaria* and mixed herbage, so that the cycle between sallow and Umbellifers is probably not fixed rigidly. Judging from the activity of the female and her catholic taste in plants it seems very likely that any one specimen would oviposit in many plants of one or more species.

All my specimens of both sexes are remarkably constant to type as described by Priesner. Young individuals resemble some of the yellow species of *Thrips* very closely in colour. In the female the hairs of abdominal segment IX may reach a length of 170μ, those of X 150μ, and the dorsal hairs of IX 70μ. Deformities of the antennal segments are common and various.

In N.E. Scotland the species is as numerous at sea-level, often on plants sprayed by the sea, as at an altitude of 1,000 feet some miles inland. In the counties round London I found it very scarce, but commoner in Sussex. Near Belfast, N. Ireland, on 1-8-28 I caught 40 females, 1 male, and numbers of nymphs I, II, after a few minutes beating of *Rubus fruticosus* for the adults and *Heracleum Sphondylium* for nymphs.

As seen within the body of the female the mature egg is elongated, somewhat reniform and equally rounded at both ends. It

measures about 300 : 120μ with a very delicate shell about 1μ thick. The young female may contain 100 minute eggs in her ovarioles, and of these1-3 eggs mature together.

Nymph II has been described by Priesner, but the other immature instars are unknown to science so I proceed to describe them.

Nymph I. Uniform bright yellow which varies from lemon- to orange-yellow. Eyes varying from bright red to dark reddish brown. Antennae and legs usually slightly paler than body. The tougher chitin of antennal segments I, II, III, base and apex of IV and the whole of V, VI uniform pale grey. Mouth-cone with palpi, coxae, base of femora, the outer sides of tibiae, the posterior dorsal margin of abdominal segment IX, and the posterior half of X the same grey colour as the chitin of the antennae. Tarsi and mouth-cone tip with darker greyish brown colour. Hairs and cuticular processes of integument pale yellowish grey.

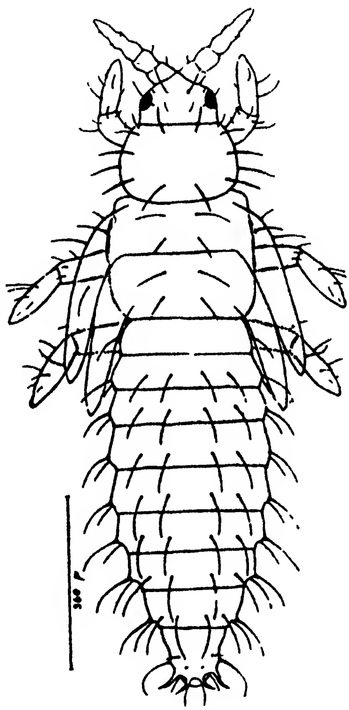
Measurements in μ : Lenght (width) : Antennal segments I 20 (29), II 29 (25), III 35-38 (32), IV 58 (29), V 15 (15), VI 26 (9); head to fore margin of eyes 72-78 (90-102 behind eyes); mouth-cone 80-90 (90-100 at base); maxillary palp segments I 4 (10), II 17 (8), III 11 (3); labial palp segments I 3 (6), II 14 (3); prothorax 108-114 (108-120 at anterior, 168 where widest); mesothorax 60-72 (192-210); metathorax 60-72 (192-210); abdomen 450-480 (220). Total length of antenna 180. Length of nymphs 570-840. Length of longest hairs : anteocular 15-20; interocular 23-26; prothoracic 23-30; tibial 14; on abdominal segment IX 53-58; X 52-58; each tooth of comb at posterior margin of IX 3 (3 width at base); each wart-like integumental process with its microsetula on the posterior part of the prothorax, the mesothorax and metathorax and abdominal segments IX, measures 2-3.

Morphology like that of a Thripid nymph I as described by Priesner (1926, Die Thysan, Eur. S.124-125). Abdominal segment I bears a mid-dorsal, transverse row of 4 hairs, whilst each of segments II-VIII carries a similar row of 6 hairs. Urosternum I is hairless, but II-VIII bears each a pair of hairs. Segment IX bears 2 dorsal pairs of long hairs expanded at the tips and one lateral pair of short, delicate hairs. Segment X bears 4 pairs of hairs of which 2 pairs are longer and expanded at the tips. The nymph is very like I of *atratus* (described by Priesner S. 306) from which it can be distinguished easily by having no darker marks on the prothorax; the longest hairs of the prothorax are probably expanded at the tips, abdominal segment IX has a dark band dorsally at its apex, and its comb consists of 3 groups, each containing 4-6 quite conspicuous teeth; the hairs of X are longer and clearly expanded at the tips and there are 6-7 transverse rows of integumental processes each bearing a microsetula on abdominal segments I-IX, and 12 such rows across the meso- and metathorax. The legs are of average proportions.

♀ Prepupa (Text fig. 1) Body colour bright greyish yellow. Antennae, legs and wings greyish yellow, paler than body though the legs may be the same colour as the body. Eyes almost black and with more or less bright red pigmentation at margins. The cuticle and hairs are pale yellowish grey which is darkest for abdominal segments VIII-IX. The 4 dorsal processes of IX are darker yellowish grey. Immediately on either side of the median, dorsal longitudinal line of the pro-, meso-, meta-thorax and abdominal segments II-VIII there is a small (12-20μ diameter) subcuticular area which may be paler than the surrounding tissue and so inconspicuous, or it may be dark brown and so con-

spicuous. The darkness of the colour seems to be more or less correlated with the age of the insect, and probably it is due to the degree of oxidation of certain substances.

Measurements in μ : Length (width) : Head 90 (168) ; mouth-cone 120 (166 at base) ; antenna 210 (42 across segment II) ; prothorax 156 (180 at anterior, 230 where widest) ; pterothorax 260 (270) ; fore-wing 360 (60 at middle) ; hind-wing 300 (48 at middle) ; abdomen 780-840 (320-336) ; each ovipositor process of abdominal segment VIII 37 (30 at base), of IX 43 (30) ; 4 dorsal processes of IX 66, 50, 50, 66 measured laterally (12 dorsally at base). Total length of insect 1140-1420. Length of hairs : Interocular 52 ; postocular 65 ; longest hairs of prothorax 72-87, of fore-wing 72-87, of tibiae I, II, III 52-58, 52-58, 52-67 respectively, on abdominal segments I, IV, VIII-X 87, 66-90, 90-116, 100, 72-80.



TEXT-FIG I.
Physothrips vulgatissimus (Hal.).
Female prepupa.

The dorsal morphology and chaetotaxy are as depicted (Text-fig. 1). The chaetotaxy of the fore pterotheca is liable to variation in the relative positions of the hairs on either pterotheca and in the numbers of hairs (+ 1-2) in different insects. The ventral chaetotaxy consists of 1 long and 2 short pairs of hairs on the head and 3 short pairs on the mouth-cone, 1 pair of long, delicate hairs on the pro- and 2 similar pairs on the meso- and meta-

thorax, few short delicate hairs on the basal segments of the legs, 1 pair of long, delicate hairs across the middle of abdominal segment II and 3 pairs similarly placed on III-VIII, and 1 shorter pair on IX. The small X segment bears 3 pairs of hairs. It ends bluntly. The XI segment is a minute area which is most conspicuous on either side of the termination of the gut. For the developing ovipositor the posterior ventral margin of VIII is produced backwards in a pair of sheaths apposed to one another in the mid-ventral line and ending before the middle of IX. A similar pair of sheaths arises past the middle of IX and extends a little beyond its posterior margin.

♀ Pupa (Text fig. 2) Varies in colour from that of ♀ prepupa to that of young adult which in general colour is little darker yellow than the prepupa and has its organs clearly defined within the pupal cuticle. The pupal cuticle, the 4 dorsal processes of abdominal segment IX and the hairs are coloured like those of the prepupa. The dorsal light or dark areas are absent from the prothorax and, when visible, less conspicuous an meso- and meta-thorax and abdominal segments II-VIII.

Measured like prepupa: Head 120 (198); mouth-cone 160 (198); antenna 330 (50) prothorax 168-180 (216, 270); pterothorax 210-240 (338-348); fore-wing 700-738 (66); hind-wing 616-624 (48); abdomen 800-858 (342-378); each ovipositor process of abdominal segment VIII 90-100 (30-34), of IX 60 (20); 4 dorsal processes of IX 104, 90, 90, 104 (18); posterior process of X 28-33 (23-26 at base). Total length of insect 1370-1420. Length of hairs: Interocular 100; postocular 100; longest hairs of antenna 80-87, of prothorax 95-110, of fore-wing 90-116, of tibiae I, II, III 90, 87, 95-107, on abdominal segments II, IV, VIII-X 100-107, 78-116, 100-120, 130-133, 72-95.

The dorsal morphology and chatetotaxy are as depicted (Text fig. 2). The antennae are turned upwards and backwards reaching the middle of the prothorax. The ventral chaetotaxy is like that of the prepupa, but the hairs are longer. The sheaths on the ventral surface of abdominal segment VIII become blade-like and terminate at the end of X, whilst those of IX are also elongated and end just above them. The X segment is prolonged in a short conical process, and XI is very small.

♂ Prepupa. Coloration like ♀ prepupa, but usually a little paler as the result of smaller size.

Measured like ♀ prepupa: Head 90 (138-150); mouth-cone 120 (130-150); antenna 180 (38); prothorax 150 (162, 210); pterothorax 210-220(230-250); fore-wing 300-318 (54); hind-wing 260-288 (36); abdomen 600-770 (290-300); 4 dorsal processes of IX 55, 46, 46, 55 (12). Total length of insect 1000-1200. Length of hairs: Interocular 45-55; postocular 50-60; longest hairs of prothorax 65-75, of fore-wing 60-75, of tibiae I, II, III 50-58, on abdominal segments I, IV, VIII-X 46-72, 43-60, 72-87, 90, 58.

Morphology and chaetotaxy like that of the ♀ prepupa, except that abdominal segments VIII and IX do not bear sheaths on their ventral surfaces and there are 2 pairs of fairly long hairs on the ventral surface of IX.

♂ Pupa. Coloration varying from that of the ♂ prepupa to that of the

young adult ♂ which is very similar in colour to a young adult ♀. The pupal cuticle with its processes and hairs is coloured like that of the ♀ prepupa.

Measured like ♀ prepupa: Head 120 (180); mouth-cone 132 (180); antenna 280 (50); prothorax 140 (180, 225); pterothorax 190-210 (240-270); fore-wing 570-600 (60); hind-wing 480-540 (40); abdomen 660-750 (270); 4 dorsal processes of IX 84, 72, 72, 84 (15); posterior process of X 6 (12). Total length of insect 1000-1200. Length of hairs: Interocular 90-100; postocular 90-100; longest hairs of antenna 70-80, of prothorax 90-95, of fore-wing 70-100, of tibiae I, II, III 90-100, of abdominal segments II, IV., VIII-X 60-72, 72-100, 90-110, 100, 60-72.

Morphology and chaetotaxy like that of the ♀ pupa, except that abdominal segments VIII and IX do not bear sheaths on their ventral surfaces and there are 2 pairs of fairly long hairs on the ventral surface of IX.

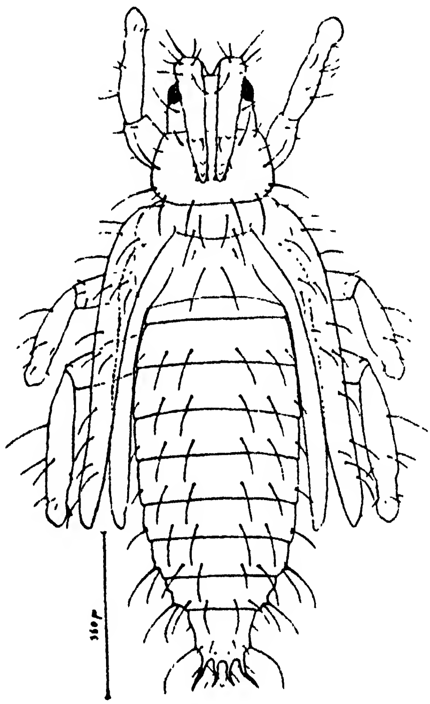
In the prepupae and pupae of both sexes the cuticle is quite smooth except on abdominal segments I-VI where it bears few minute processes like those of the nymph but without microsetulae; the eyes are conspicuous, but difficult to measure accurately; the maxillary and labial palps are small, blunt, unsegmented prominences; the legs are normal; as in the nymphs the spiracles lie on the mesothorax and abdominal segments II and VIII; the hairs end in very fine points; the 4 Malpighian tubes are inconspicuous though visible through being darker yellow than the surrounding tissues. Testes-rudiments are not visible till the pupa is almost mature.

Nymph I, prepupae and pupae are described from specimens found in Aberdeenshire and Kincardineshire. Nymph I is described from many specimens found chiefly on *Conium maculatum*. The ♀ prepupa was described from 19, the ♀ pupa from 17, the ♂ prepupa from 25 and the ♂ pupa from 19 specimens, all of which were bred from nymphs found on Umbelliferae. I have deposited in the British Museum (Natural History) 5 type-slides holding numerous nymphs I, 5 ♀♀ prepupae, 3 ♀♀ pupae, 4 ♂♂ prepupae, 4 ♂♂ pupae.

Physothrips atratus (Hal.).

Life-history: In N.E. Scotland the life-history is very like that of *vulgatissimus*, but the adults favour Labiates and the most favoured plant of the nymphs is Corn Spurrey, *Spergula arvensis*. Females occur during early April on many species of plants. Presumably they oviposit in different species of plants for I have found nymphs in June in mixed herbage amongst which I cannot specify host-plants. Males first occur at the end of June. Almost certainly they are the progeny of the ♀♀ which

appeared in April. Both sexes of the first generation become very abundant on most flowering plants towards the end of July. By this time corn spurrey has developed considerably and it is now sought by the ♀♀ as the host plant for the second generation of nymphs. These nymphs become mature during September. Both sexes occur in about equal numbers amongst the adults of the second generation. The ♂♂ die out during October, probably after fertilising the ♀♀ which hibernate amongst plant débris till the following spring when they commence ovipositing.



TEXT-FIG. 2.
Physothrips vulgatissimus (Hal.).
Female pupa.

All instars are like *vulgatissimus* in habits except that adults do not jump. The durations of the prepupal and pupal stadia of the second generation is the same as in *vulgatissimus*. Certainly all the individuals of the second generation are not bred on spurrey; and owing to the luxuriance of vegetation during the summer months, the catholic tastes of the nymphs, the probably fairly long period of oviposition of each ♀, the dates between the two generations are not rigidly fixed.

I have found adult *atratus* on 95 species of flowering plants. During April-June ♀♀ alone may be very numerous in various flowers in one locality but not in another; then during July-October ♀♀, ♂♂ may be very common together in flowers, or one sex may predominate very considerably in numbers. The insects may be associated with *vulgatissimus* or *Thrips* spp. adults and nymphs.

The insect is very constant to type as described by Priesner, except that the hairs on abdominal segments IX, and X of the ♀ may be longer than stated by him: tergum IX lateral hair 174, the more middle at the hind margin 150, the dorsal, before the middle, 58-65, and the upper hairs on tergum X 145 μ. Uzel's var. *adustus* is the coloration of young individuals, but the youngest individuals are paler, yellowish grey. Deformities of the antennal segments are varied and common, also the chaetotaxy of the first vein of the fore wing is quite commonly variable, 6-12 hairs.

Distributed in N.E. Scotland like *vulgatissimus*, but contrary to *vulgatissimus* the species is common on wild and cultivated plants in the counties round London and in London gardens. Near Belfast, N. Ireland, during 1-8-28 I found 1 ♀, 1 ♂ on *Rubus fruticosus* with *vulgatissimus*.

The mature egg measures 260 : 110 μ with a shell 1 μ thick. It is like that of *vulgatissimus*, and 1-4 eggs mature at about the same time whilst a young ♀ may contain 120 minute eggs in her ovarioles.

Nymphs I and II have been described by Priesner (1926 Die Thysan. Eur. S.306-7) but the other immature instars are unknown to science so I proceed to describe them.

Measured like the corresponding instars of *vulgatissimus*.

♀ Prepupa. Head 106 (156); mouth-cone 130 (156); antenna 200-230 (42); prothorax 168 (170, 234); pterothorax 250 (280); fore-wing 324-340 (60-66); hind-wing 270-276 (42-48); abdomen 780-820 (290-312); ovipositor process of VIII 35 (30), of IX 40 (30); four dorsal processes of IX 63, 57, 57, 63 (12). Total length of insect, 1260-1350. Length of hairs: Interocular 60-66; postocular 60-66; longest hairs of prothorax 70-90, of fore-wing 90, of tibiae I, II, III 40-50, on abdominal segments I, IV, VIII-X 60, 70-80, 90, 100, 63-66.

♀ Pupa. Head 110-120 (180-190); mouth-cone 150 (180-190); antenna 340-380 (54-60); prothorax 168-180 (200, 252); pterothorax 270 (312-330); fore-wing 600-630 (60-72); hind-wing 504-540 (42-48); abdomen 730-900 (310-330); ovipositor process of VIII 90-95 (36), of IX 60-65 (24); four dorsal processes of IX 110, 90, 90, 110 (18); posterior process of X 30-40 (34-36). Total length of insect 1200-1470. Length of hairs: Interocular 90-110; postocular 90-110; longest hairs of antenna 63-87, of prothorax 90-116, of fore-wing 90-116, of tibiae I, II, III 60-110, 50-110, 80-100, on abdominal segments II, IV, VIII-X 72-100, 90-110, 110-116, 116-124, 75-87.

♂ Prepupa. Head 90 (150); mouth-cone 120 (150); antenna 180-190 (36); prothorax 160 (160, 200); pterothorax 190-217 (240-270); fore-wing 246-260

(43-50); hind-wing 217-230 (36); abdomen 690-725 (270); for dorsal processes of IX 55, 50, 50, 55 (12). Total length of insect 1100. Length of hairs: Interocular 58; postocular 58; longest hairs of prothorax 60-72, of fore-wing 72, of tibiae I, II, III 43-50, on abdominal segments IV, VIII-X 58-72, 72, 72, 60.

♂ Pupa. Head 108-120 (162-180); mouth-cone 130 (162-180); antenna 300 (42); prothorax 150 (170-190, 200-220); pterothorax 210-240 (250-276); fore-wing 510-570 (50-60); hind-wing 420-468 (36-38); abdomen 670-750 (240-250); four dorsal processes of IX 90, 85, 85, 90 (18); posterior process of X 6 (12). Total length of insect 1100-1230. Length of hairs: Interocular 90-100; postocular 90-100; longest hairs of antenna 72-80, of prothorax 87-100, of fore-wing 90-100, of tibiae I, II, III 87-95, on abdominal segments II, IV, VIII-X 80, 87, 95-100, 95-104, 72.

The coloration, morphology and chaetotaxy of the prepupae and pupae of either sex is like that of the corresponding instar of *vulgatissimus*. For separating the species the chief character is the shorter wings of the *atratus;* the next character is the comparative lengths of the 4 dorsal processes of abdominal segment IX, but this is not a satisfactory character because when an insect is properly mounted with its back uppermost, it is usually impossible to measure accurately the lengths of these processes. In adults of either sex of both species the wings are very variable in length with complete intergrading between the extremes, *e.g. vulgatissimus* ♀♀ fore-wing 930-1100 (65-75 μ), hind-wing 840-947 (50-55); ♂♂ fore-wing 780-930 (60-70), hind-wing 690-850 (42-54); *atratus* ♀♀ fore-wing 920-1050 (65-75), hind-wing 770-870 (54-56); ♂♂ forewing 770-870 (60-65), hind-wing 720-830 (45-48).

The ♀ prepupa was described from 6, the ♀ pupa from 10, the ♂ prepupa from 2 and the ♂ pupa from 10 specimens bred from nymphs found on *Spergula arvensis* in Kincardineshire. The nymphs were found in August and the prepupae and pupae were killed during September, 1928. I have deposited in the British Museum (Natural History) 4 type slides holding 1 ♀ prepupa, 1 ♀ pupa, 2 ♂♂ prepupae, 1 ♂ pupa.

Phyothrips latus Bagnall.

Priesner (1926, Die Thysan. Eur. S.315-318) considers that *propinquus* Bagn. is a variety of *latus* Bagn., since he finds no constant morphological difference between them. I agree with Priesner's observations on the morphology of ♀♀, ♂♂ *latus* and ♀♀ *propinquus;* also this view is supported by my studies of the immature instars and the life-histories of these insects. The two types of insects belong to a single species which is essentially linked in its life-history with the leaf-cycle of the birch, *Betula alba.*

In N.E. Scotland the life-history is very like that of *vulgatissimus* and *atratus*. Apparently only ♀♀ survive the winter. They appear at the end of April or early in May when the leaf-buds start opening on their host-plant, *Betula alba*. They seem to hibernate near birch trees in the soil or undergrowth, and during their journey from their winter quarters to the birch leaves, they may be found scattered on other plants near birch. Like *vulgatissimus* and *atratus* the ♀♀ when they first appear are very darkly coloured (*propinquus*) and non-ovigerous, but by the middle of May the birch has developed succulent green leaves and the ♀♀ become ovigerous and oviposit in it. The pale nymphs I, II occur on birch towards the middle of June and become adults by the end of June or early in July. These adults include both sexes which are all pale coloured (*latus*). The first generation gives rise to a second generation of slightly darker ♀♀, ♂♂ *latus* of which the nymphs appear during July-August and the adults during August-September. During September the birch leaves become withered previous to falling in October. Presumably the ♂♂ of the second generation die after fertilising the ♀♀ of which some survive the winter and become dark *propinquus* that start a new life-cycle in the spring.

Amongst the ♀♀ there is a complete gradation in colour from lightest *latus* to darkest *propinquus*. Amongst the ♂♂ I have found light, and darker *latus*, never dark *propinquus*. Owing to the numbers of ♀♀ and the length of their oviposition period, there is a considerable overlapping of the generations. Some overwintered ♀♀ survive till July.

The ♀♀, ♂♂ of *latus* and the ♀♀ of *propinquus* do not jump or try to fly even under the stimulus of bright, warm sunshine, but they walk briskly unless placed in shade or cold when they become very sluggish almost immediately. The nymphs look pale whitish-coloured in the field. They compare in activity with the other two species. Unlike *vulgatissimus* and *atratus* the entire life-history during the immature instars is spent on the host-plant so that prepupae and pupae may be found with nymphs on birch.

In Aberdeenshire and Kincardineshire during the last 5 years I have found the insect commonly on birch. About 10 adults and 100 immature instars may be beaten off the lower branches of a 20-foot-high birch in early July. Nymphs frequent the lower surfaces of the leaves whilst adults wander to other parts as well. Though both adults and nymphs imbibe chlorophyll with their food they seem not to harm the tree beyond a little local injury to the under surface of some leaves. Shortly after finding this

species in 1924 at Torphins, Aberdeenshire, I mounted some specimens of adults and nymphs in Canada balsam after rapidly clearing them in cedar-wood oil after an imperfect dehydration in absolute alcohol. The result was that the alcoholic solution of chlorphyll coloured the entire insects including the ovipositor blades bright green. The colour disappeared later, but it still remains in the cedar-wood oil-chlorophyll mixture of the contents of the gut, and this is what is seen and mentioned by Priesner (S.318, line 12, where 1914 should be 1924).

On birch the insects are associated with the usual fauna (largely Homoptera) of birch in this region. As usual a tree heavily infested with aphids is free or practically free from thrips. No enemies were observed.

As seen inside the body of the ♀ the mature egg measures 230 : 102 with a shell 1 μ thick. The shape is like that of *vulgatissimus*. Forty minute eggs may be seen in the ovarioles, whilst 1-5 mature at about the same time in both *latus* and *propinquus*.

The hitherto unknown nymph I, prepupa ♀, pupae ♀, ♂ are described below. Priesner has described nymph II, and I do not possess specimens of the ♂ prepupa. The insects are measured like the corresponding instars of *vulgatissimus*.

Nymph I. General body colour very pale yellow with head little darker and prothorax still darker yellow though still pale. Antennae and legs about the same general colour as body. Eyes dark reddish brown. The tougher chitin of antennal segments I, II, III, base and apex of IV and the whole of V, VI uniform pale grey. Mouth-cone with palpi, coxae, basal halves of femora, the base and outer sides of tibiae the same grey colour as tougher chitin of antennae. Abdominal segment IX is not banded at the apex, whilst X is only slightly darker at apex than at base. Tarsi and mouth-cone tipped with darker greyish brown. Cuticle and hairs pale yellowish grey.

Antennal segments I 17 (26), II 30 (23), III 32-34 (32), IV 52 (29), V 12 (12), VI 20 (8), head 66-72 (90-100); mouth-cone 90-96 (90-96); maxillary palp segments I 8 (9), II 8 (9), III 17 (9); labial palp segments I 3 (7), II 12 (3); prothorax 108 (108-120, 144-150); mesothorax 72-90 (160-180); metathorax 60 (160-180); abdomen 320-370 (170-190). Total length of antenna 168, of nymphs 600-730. Length of longest hairs: Anteocular 15-20; interocular 20-26; prothoracic 20-30; tibial 15-23; on abdominal segment IX 46-50; on X 43; widest diameter of expanded tips of hairs 3; each tooth of comb on posterior margin of IX 5 (1); each wart-like integumental process with its microsetula on abdominal segments

I-IX measures 2, those on the posterior parts of the meso- and meta-thorax measure 1.

Nymph I in its general morphology and chaetotaxy is like *vulgatissimus* and *atratus* though it is easily separated from them though the details of its morphology and chaetotaxy and its much paler colour. The characters for separating the three species are (1) colour, (2) marks on pronotum, (3) length and shape of posterior prothoracic hairs, which are clearly expanded at the tips in *latus*, (4), the colour of the apex of abdominal segments IX, X, (5) the shape and length of hairs of IX, X, (6) the comb of IX, which in *latus* consists of 13-16 regularly spaced very fine teeth, (7) the transverse rows of cuticular processes bearing microsetulae on abdominal segments I-IX are smallest and palest in *latus* on which they number 5-6 rows per segment.

Nymph II is usually very pale yellow, but it ranges from pale to bright yellow and the prothorax is usually the brightest yellow. Abdominal segment IX has on its posterior dorsal margin a comb of about 20 very minute teeth equally spaced. The legs in this instar and in I bear the same proportions to the body as the legs in the corresponding instars of the other two species. When full grown the length is about 1180 (320 across abdomen). Other details are as described by Priesner.

♀ Prepupa. Body colour very pale greyish-yellow. Antennae, legs and wings about the same colour as body. Eyes almost black and with more or less bright red pigmentation at the margins. Cuticle and hairs are uniformly very pale yellowish-grey.

Head 90 (130); mouth-cone 90 (130); antenna 180 (40); prothorax 130 (150, 200-216); pterothorax 217 (217-240); fore-wing 270-276 (43-46); hind-wing 220-230 (32-34); abdomen 650-660 (310); ovipositor process of VIII 23 (26), of IX 20 (15); four dorsal hairs of IX 72, 64, 64, 72. Total length of insect 1050-1140. Length of hairs: Interocular 46; postocular 49-52; longest hairs of prothorax 43 anterior, 58-63 posterior, of fore-wing 46-58, of tibiae 43, on abdominal segments I, IV, VIII, IX (lateral), X 40, 52-58, 64, 46, 47-50.

It is very similar to the corresponding instars of *vulgatissimus* and *atratus*, though it may be distinguished easily by its paler colour and smaller size and by having 4 hairs across urotergum I, 4 long hairs in the place of processes on IX, the long lateral hairs of IX reduced in length, and the short dorsal pair absent. It answers very well to Priesner's description (S. 313 *loc. cit.* and 1922, Sitzb. Akad. Wiss. Wien 128, S.72-73) of the prepupa of *salicis* (Reuter) from which it may be separated by having 5 hairs on the fore-wing, conspicuous hairs on the head, and different measurements.

♀ Pupa varies in colour from that of prepupa to that of young adult *latus*. The pupal cuticle and hairs are coloured like those of the prepupa.

Head 90 (132-150); mouth-cone 120 (132-150); antenna 230-250 (42-48); prothorax 108-120 (150-180, 210); pterothorax 180 (240); fore-wing 420-468 (42-54); hind-wing 360-400 (24-36); abdomen 450-640 (280-290); ovipositor process of VIII 58 (29), of IX 46-49 (17); four dorsal hairs of IX 90, 80, 80, 90; posterior process of X 20 (7). Total length of insect 830-1050. Length of hairs: Interocular 72; postocular 72-80; longest hairs of antenna 72, of prothorax 72-80, of fore-wing 63-72 (marginal hairs 30-40), of tibiae 72-80, on abdominal segments II, IV, VIII, IX (lateral), X 23-46, 58-66, 85, 78-87, 58.

It is very similar to the corresponding instars of *vulgatissimus* and *atratus* though it may be distinguished easily by its paler colour and smaller size and by having 18-20 hairs evenly spaced along the front margin of the fore-wing besides 9 hairs distributed on the upper half and 2 near the apex, also by having 4 long hairs in the place of processes on abdominal segment IX, the long lateral hair of IX reduced in length, but a longer more ventral hair is present with only 1 pair of short dorsal hairs. It answers very well to Prieśner's description of *salicis* from which it probably could be separated on the basis of measurements.

♂ Pupa varies in colour from that of ♀ prepupa to that of young adult ♂ *latus*. The pupal cuticle and hairs are coloured like those of the ♀ prepupa.

Head 72+ (130); mouth-cone 110 (130); antenna 200 (30); prothorax 100+ (145, 175+); pterothorax 145 (190); fore-wing 360-370 (32); hind-wing 290 (23); abdomen 380+ (190); four dorsal hairs of IX 72, 66, 66, 72; posterior process of X 3 (3). Total length of insect 580+. Length of hairs: Interocular 50; postocular 50; longest hairs of antenna 58, of prothorax 46-52, of fore-wing 45 (marginal hairs 20-37), of tibiae 42-58, on abdominal segments II, IV, VIII, IX (lateral), X 20-43, 30-43, 50-72, 60, 46.

It is very similar to the corresponding instars of *vulgatissimus* and *atratus*, though it may be distinguished easily by its paler colour and smaller size and by having 13-19 hairs evenly spaced along the front margin of the fore-wing besides 9 hairs distributed on the upper half and 2 near the apex, also by having 4 long hairs in the place of processes on abdominal segment IX. It answers very well to Priesner's description of *salicis* from which it could be separated by the absence of the backward extension of the ventral margin of IX, and probably also by measurements.

Nymphs I, II, prepupa and pupae are described from specimens found on birch in Aberdeenshire and Kincardineshire. Nymph I is described from 20, nymph II from about 100, the ♀ prepupa from 2, the ♀ pupa from 7, and the ♂ pupa from 3 specimens. The ♂♂ pupae unfortunately became shrivelled during mounting. I have deposited in the British Museum (Natural History) 4 type slides holding 6 nymphs I, 1 ♀ prepupa, 1 ♀ pupa and 3 ♂♂ pupae.

Marischal College, Aberdeen, N.B.
April 25th, 1929.

NOTES ON THE GENUS *LEUCTRA* WITH DESCRIPTIONS OF TWO NEW SPECIES, AND ON THE GENUS *CAPNIA* INCLUDING A SPECIES NEW TO THE BRITISH FAUNA.

BY KENNETH J. MORTON, F.E.S.

PLATES VI, VII.

During a long visit to Switzerland in the summer of 1927, Mr. Martin E. Mosely collected extensively in many different localities at diverse altitudes. Amongst other insects, mainly *Trichoptera* and *Plecoptera*, he amassed a very large series belonging to the genus *Leuctra*. These have given rise to a lively correspondence which has not only revived my own interest in these insects, but has also led to interesting discussions regarding the species dealt with by the late Dr. Kempny and Professor Klapálek in their respective works. From both of these authors I have received much material, including paratypes from the former, and these have proved useful. All the problems connected with the Western and Central European species are not yet satisfactorily solved, but as one of the species involved is found in Britain it seems desirable to say something on the subject at once. The species which has hitherto stood in our lists as *Leuctra albida* Kempny, and which was so determined by Kempny himself from Scottish examples, is not the true *albida* of Kempny. It is closely allied but quite distinct, and I have long doubted Kempny's determination. Mosely's Swiss material of both serves abundantly to prove their distinctness. I have pleasure in naming the new species *Leuctra moselyi* in recognition of the excellent work of my friend, whose zeal and material were invaluable in our attempt to clear up doubtful points connected with the genus.

As little or nothing of importance has been published in this country on the species of *Leuctra,* the introduction of a new name to our lists seems a suitable occasion for giving figures which I had made a good many years ago. These, along with some notes, may serve for purposes of identification of our few species. For reasons which will appear later, notes and figures relating to the British species of *Capnia* are added.

With few exceptions, the species of *Leuctra* cannot be determined from dried specimens, but from such material, even when old, useful preparations can be made at any time. The figures of both sexes are all drawn with camera lucida from specimens cleared in caustic potash. The males may be separated by the characters given in the following table. The females are recognisable from the form of the sub-genital plate on the eighth segment.

Males of *Leuctra*.

1\. Joints of antennae with whorls of outstanding bristle-like hairs; largest species .... *geniculata* Stephens.
– Joints of antennae without such bristles .... 2.
2\. Dorsum of abdomen viewed from side with projecting processes on at least two segments .... 4.
– Dorsum of abdomen without projecting processes .... 3.
3\. No strongly chitinized raised special structures .... *inermis* Kempny
– Eighth segment, viewed from above, with two raised parallel chitinized markings, each somewhat resembling a horse's foot ...... *hippopus* Kempny.
4\. Seventh segment without projecting processes .... 7.
– Seventh segment with projecting processes .... 5.
5\. Sixth segment, viewed from above, with two flattened upstanding processes arising from anterior part of segment .... 6.
6\. Seventh segment, viewed from above, with the projecting processes short, placed dorso-laterally near the middle of the segment's length, their apices blunt or almost truncate; processes of sixth segment rather close together (not yet known as British) .... *albida* Kempny.
Seventh segment with the projecting processes short arising from the posterior part of segment, their apices more rounded, convergent; processes of sixth segment rather more widely apart .... *moselyi* n. sp.
Seventh segment with the projecting processes longer, arising from the posterior part of segment, their apices rather more pointed, longer and directed decidedly caudad .... *klapáleki* Kempny.
7\. Eighth segment with two strong minutely-serrate processes arising from its anterior part; processes on anterior margin of sixth segment smaller and also serrate .... *nigra* Pictet.

Leuctra geniculata Stephens.—Occurs at rivers and streams as well as standing waters in August and September (also October and November according to Mosely) from Scotland to Devon. I am not acquainted with any records from Ireland.

L. moselyi n. sp. At small hill streams from Inverness to Merioneth in July and August.

Some of the preparations of the males of this species show on the dorsum of the fifth segment two structures simulating on a smaller scale the dorsal processes of the sixth segment. Their exact nature is at present obscure. In their extreme development they seem to rise above the level of the dorsum, while in other preparations they seem to be sub-cutaneous, while in yet others they are either absent or only rings which appear to form their base can be traced through the cleared chitin.

This species was found by Mosely abundantly in Switzerland. It should be noted that Kempny's figure of the ♂ of his *L. carinthiaca* (Verhandl. der K. K. Zool. bot. Ges., XLIX, 1899) bears considerable resemblance to the present species. This problematical ♂ was lost after he had made his drawing. However, as he says, he distinctly remembered that he had before him a

pair taken in copula, and as authentic females of *L. moselyi* are present from both Britain and Switzerland, and are quite different from his figure of the ♀ of *carinthiaca*, no association of our species with the latter is feasible.

L. klapáleki Kempny.—At lakes and streams, general, from July until November. Kempny at Gutenstein, Lower Austria, found it in December and even well on in January in mild weather.

L. hippopus Kempny.—At clear streams and rivers, appearing as early as March, but may be found much later in higher-lying localities. No doubt found all over the British Isles. I have seen no variation of importance in examples from Britain, but on the Continent the species may run into local races. A well-defined, allied species has been taken in Corsica by Mosely, and will be described later.

L. inermis Kempny.—In the same localities as the last, especially in hilly districts, appearing not quite so early as a rule, although the two are often found together. From Inverness to Devon and also in Ireland.

On account of the absence of any very striking structural characters in the ♂, the group to which this species belongs is a little difficult. Three names appear in Kempny's writings, *L. handlirschi*, *inermis* and *handlirschi* var. *teriolensis*. I do not appear to have received the ♂ of the first-named from Kempny in the material kindly sent by him. In his paper in the Verhandl. der K. K. Zool. bot. Ges., Vol. L, p. 257, he refers to Scottish specimens which I sent him and which he considered *inermis*, but some of them coming near *handlirschi*; he came to the conclusion that the two were but local races of one species. On the other hand, I am of opinion that *teriolensis* is a good species. It is clear that Klapálek's figure of *inermis* ♀ (Süsswasserfauna Deutschlands, 1909, Plecoptera, p. 68) does not refer to Kempny's species of that name. It shows a definite lobe at the base of the subgenital plate (not a mere swelling), and the outline of the apical margin of the plate is different. Klapálek's species is probably something allied to *teriolensis*, if it is not that species. Although only one British species in known to me, Mosely believes there may be one or more new species of this group included in his Continental material.

L. nigra Pictet.—Appears to be attached to marshy ground with springs, and is probably generally distributed, as I have seen it from such widely separated localities as Perthshire and the New Forest.

Further discussion of certain Continental forms, one or two of which have been mentioned in the foregoing, must be reserved for another occasion. It is expedient, however, to refer specially to one more case in which there has been confusion between two species, for one of which I propose the name of

Leuctra cincta n. sp.

This is the species described and figured by Klapálek in the Süsswasserfauna Deutschlands under the name of *L. cingulata,* from which it is quite distinct. I possess paratypes of *cingulata* Kempny from the Radstätter Tauern (Handlirsch, August, 1897). Mosely took both *cingulata* Kempny and *cincta* on his Swiss excursion. The males of the two may be separated as follows :—

In the middle of the anterior part of the dorsal surface of 6th segment, from the hind margin of the chitinized plate, arise two parallel processes, their apices irregular in outline, separated from each other by about their own breadth. On 7th segment no outstanding process arises from the inner margin of the latero-dorsal chitinized plates. On 8th segment the latero-dorsal plates at about the middle (or the hindmost third) of their inner margin have a small, apparently somewhat pointed, process or thickened expansion of the plate. *cingulata* Kempny.

Dorsal processes of 6th segment shorter and broader, placed more lateral and therefore more widely apart, their apices truncate or very slightly curved. On 7th segment on the inner margin of the latero-dorsal plates a small but distinct rounded process directed mediad. On 8th segment, about the midlde of the inner margin of the latero-dorsal plates, a small, distinct, rather slender clavate process directed slightly mediad and strongly caudad. *cincta* n. sp.

In both species, on 7th segment the latero-dorsal plates are on the anterior margin of the segment continued in a narrow line mediad, joining in the middle of the dorsum.

Kempny's figures of *cingulata,* taken in conjunction with his description, leave no doubt about the identity of his species, and it is certainly different from that figured by Klapálek. The figures of the females given by the two authors are quite irreconcilable. That of Klapálek's may, I think, be definitely referred to *cincta.*

Capnia vidua Klapálek.

I am indebted to Mr. E. Percival and Mr. H. Whitehead, of Leeds (the former now Professor of Biology in the University of Christchurch, N.Z.) for specimens (♂ ♀) of an exceedingly interesting species of *Capnia,* taken by them in numbers at Maize Beck, Upper Teesdale, on 17th April, 1928. These I have referred to the above-named species, which was described in the Bohemian language in Vest. Ces. Akad. Roc. XIII. A German description was given later in Bull. internatl. de l'Acad. des Sciences de Bohême, 1906, in a paper, 'Ein Beitrag zur Kenntnis der Neurop-

teroiden-Fauna von Croatien-Slavonien und der Nachbarländer.' Klapálek's captures were made in the Tatra mountains on 10th—12th August (Hinsens-See 1,961 m., and Eis-See 1,940 m.), and were all females. I have had in my collection, given to me many years ago by Mosely, a preparation of a ♀ taken at Argyll Beck, R. Eden, 12th April, 1910, which is undoubtedly the same as the Teesdale insects, and which I have always regarded as *C. vidua*. It agrees with Klapálek's figure, which appears in both of his papers. A ♀ paratype is in my collection. This species, which exhibits in a strong degree the micropterism to which a number of our *Plecoptera* are so prone, may be separated from our other two species, *C. nigra* Pictet and *C. atra* Morton by the form of the dorsal plates of the abdomen and the supra-anal process of the ♂ and by the sub-genital plate of the ♀. The venation in the ♀ wings is very like that of *C. atra*, to which group it belongs; the wings of the ♂ are reduced to mere vestiges. The ♂ has the dorsal plate of segment 6 deeply excised in its posterior half, the corners of the excision slightly produced, obliquely truncate and slightly raised. The following segment has the posterior margin rounded in the middle, forming a raised tubercule with short spines. The superior part of the supra-anal process seen from above appears as an elongate, nearly parallel-sided figure; this consists of two closely approximated valves, which on their inner side in the apical part bear a series of long hairs which extend to the tip. This fringe is very likely capable of display, something after the fashion of what is seen in *C. atra* when the valves are open. Schoenemund's minute figure in Die Tierwelt Mitteleuropas gives the impression that the process consists of one piece, but in our insect there are two parts as in *C. atra*, although, no doubt, these usually lie closely together, and in this position they show in outline a likeness to the figure mentioned.

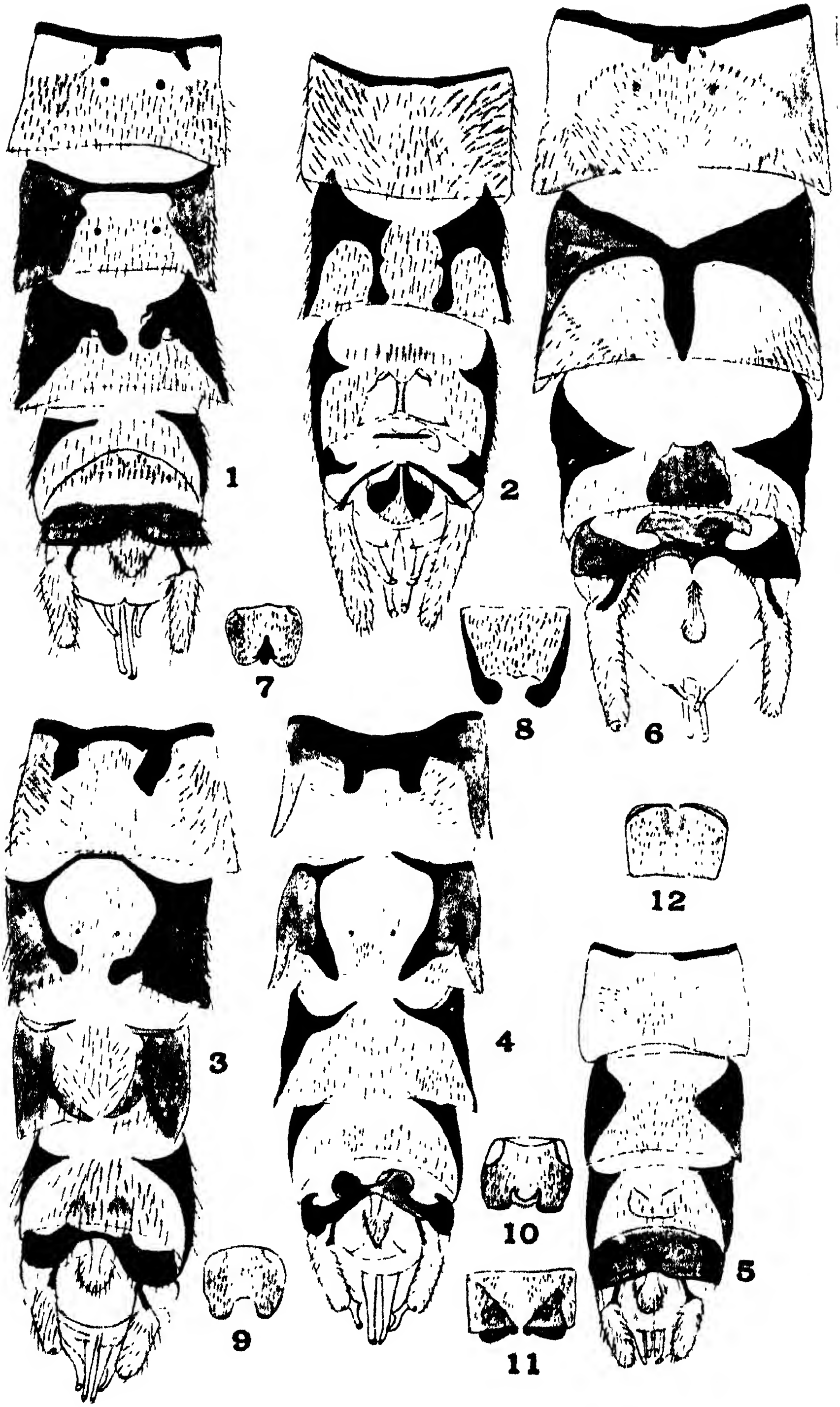
Length of body (in preparation):

♀ 7 mm.; fore-wing 3 mm. (Teesdale).
6 mm.; ,, 2½ mm. (Eden).
♂ 5½-6 mm.; f.w. ·66 mm., h.w. ·5 mm.

Klapálek's measurements:

♀ 9 mm.; f.w. 4·3 mm. (Hinsens See).
f.w. 7 mm. (Eis See).

Klapálek's record of a short-winged form and one showing no important abbreviation from two localities differing little in altitude is very interesting.



K. J. M. del.

The British species of *Leuctra*.

C. atra Morton.

As my figure of the supra-anal process of this species in Trans. Ent. Soc. Lond., 1896, Pl. II, is lacking in detail, I give some fresh figures. In specimens cleared in caustic potash there are distinctly visible through the chitin dense masses of long hairs in the upper part of this process. Some years ago in making preparations, I was delighted to find that in several of them the inner parts bearing the hairs had become strongly everted, presumably due to the boiling process, the hairs being displayed like a fan (Fig. 19). No doubt, the same display may take place naturally, and is probably connected with sexual attraction. Seen from above, the two valves of the upper part of the process when closed form a somewhat triangular figure, the apex of the triangle pointing cephalad. In Fig 17, the valves are open and the hair fringes displayed.

Specimens of *C. atra* from the Devil's Punch-bowl on Mangerton, Kerry, where it was common in June and July (Halbert and King, Proc. Royal Irish Academy, 1910) showed a tendency to micropterism. Perhaps these should be re-examined, although I have no reason to doubt my determination of them.

C. nigra Pictet.

On 17th April, 1903, at Loch Ard, Perthshire, I took a very short-winged ♀, which I am unable to separate from this species, and quite near the same spot a typical specimen of the almost wingless ♂. Again on the 27th April, 1925, at Coniston Lake, N. Lancashire, I found a little series of females of the same form (length of fore-wing about 4 mm.), but failed to find any males. I do not remember having seen any previous record of this short-winged condition in *C. nigra*. It may be taken that all our British species of *Capnia* show a tendency towards wing-abbreviation.

Explanation of Plates VI, VII.

Plate VI.

Genus *Leuctra*.

	Terminal segments of abdomen of ♂, dorsal view.	Subgenital plate of ♀.
L. nigra ...	... Fig. 1.	... Fig. 7.
hippopus ...	... 2.	... 8.
moselyi ...	... 3.	... 9.
klapáleki ...	... 4.	... 10.
inermis ...	... 5.	... 11.
geniculata	... 6.	... 12.

PLATE VII.

Genus *Capnia*.

	Apex of abdomen of ♂.			Sub-genital plate of ♀.
C. nigra.	from side	Fig. 13.	...	Fig. 23.
	from above	14.		
	from beneath	15.		
C. atra.	from side	16.	...	Fig. 24.
	from above	17.		
	from beneath	18.		
	supra-anal process (much enlarged)	19.		
C. vidua.	Supra anal process ♂ from side	20.	...	Fig. 25.
	The same (smaller scale) slightly inclined towards observer	21.		
	Abdominal segments 6-7 of ♂ from above.	22.		

13 Blackford Road, Edinburgh.
March, 1929.

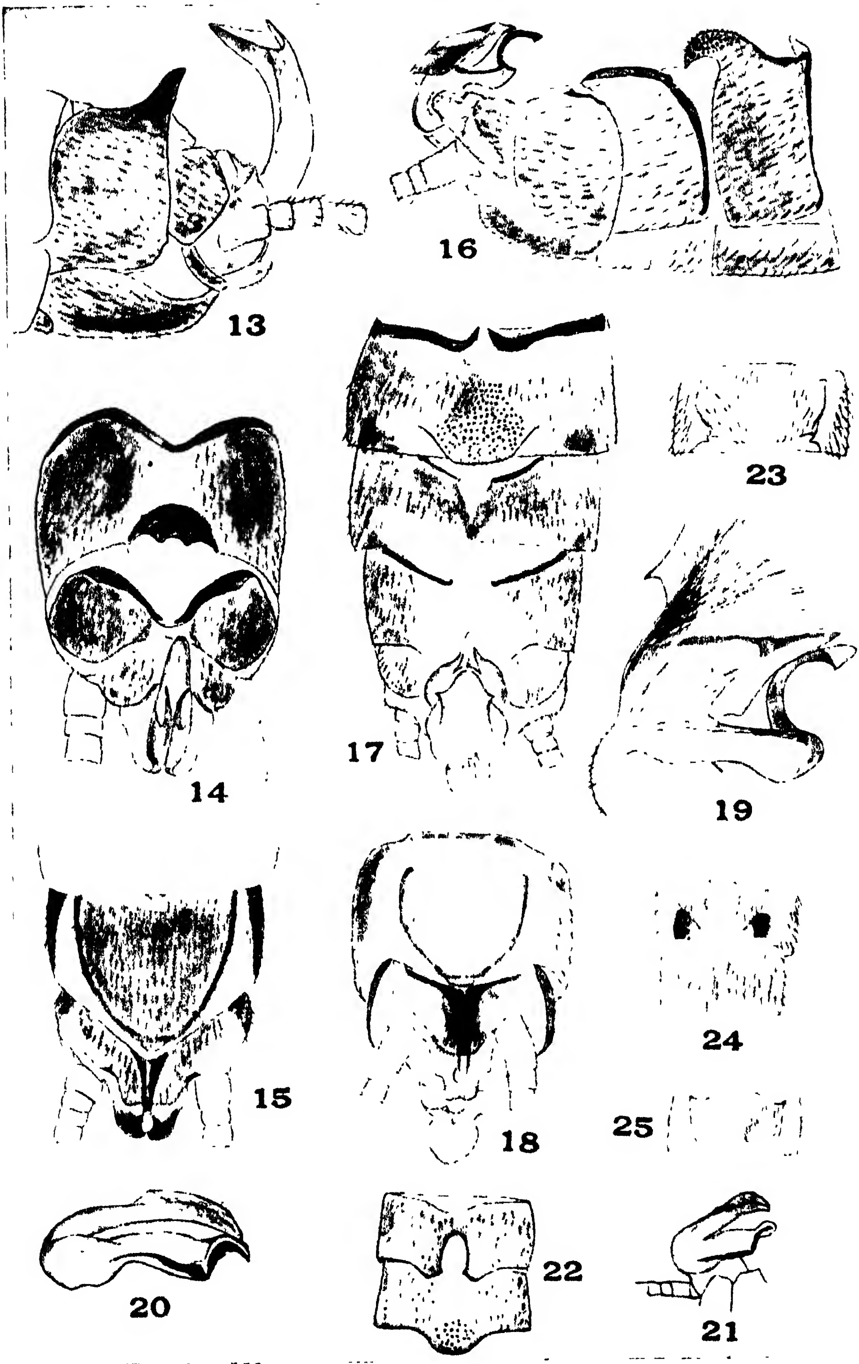
IRISH ICHNEUMONIDAE.

BY THE REV. W. F. JOHNSON, M.A., F.E.S.

The Ichneumonidae enumerated below were taken in the County Down in the years 1927 and 1928, except a few taken in County Louth, near Dundalk. The localities in County Down are Newcastle, Rostrevor and Warrenpoint.

At Newcastle most of my specimens were taken in Donard demesne about rhododendron and bramble. There were certain bushes to which I went day after day, and always got something about them. Outside the demesne, there was a place on the hill-side where some of the last houses in Newcastle were perched, and where there were some patches of Umbelliferae on which I got a few specimens, which I have noted as 'hill.'

I was at Dundalk from 10th to 15th July, 1927, and took my specimens in the grounds of my brother-in-law's house. I was at Rostrevor from July 1st to August 5th, 1927, with the exception of my visit to Dundalk. My localities there were the garden of the house I was stopping in and the woods and roadsides. I left Newcastle in December, 1927, and went back to Rostrevor, staying there till March, 1928, when I went to reside in Warrenpoint. At Warrenpoint I got a good many specimens in a piece of waste ground, where there were some remarkably fine plants of the



K. J. M. del.

The British species of *Capnia*.

'Scotch Thistle' (*Onopordon Acanthium*), which were much resorted to by a fine form of *Angitia rufipes*. Besides this place, I got specimens in the Clonallon road and in a field. My friend, R. G. Atkinson, of the Vicarage, Rostrevor, brought me from time to time specimens which he took at Rostrevor, mostly at light in the house. I am indebted to him for specimens of *Ophion mocsaryi* and *O. luteus*.

I was very pleased to get *Stylocryptus bispinus* Thoms., but unfortunately the roadman cut down the thistles where I took it, and I was unable, in spite of diligent search, to obtain another specimen. 1927 was not a good year, but 1928 was much worse. Cold, wet and sunless, it was not favourable for anything but water-fowl; even in August we had a fire, and were glad of it. This weather was, of course, very bad for Hymenoptera, and will account for the paucity of my captures. I am hoping that the coming summer may be a good one.

Unless otherwise noted, all my captures at Newcastle, Dundalk and Rostrevor were made in 1927, those at Warrenpoint in 1928.

I have used the following abbreviations: N = Newcastle, Dk = Dundalk, R = Rostrevor and W = Warrenpoint.

ICHNEUMONINAE.—*Coelichneumon derasus* Wesm., ♂, N. 13.v; *Stenichneumon culpator* Schr., ♀, W. 6.vii; ♂ var. *adsentator* Tischb., antennae entirely black, R. 4.viii.1928; another var. ♂, antennae white-ringed but hind body entirely black, W. 17.viii. *S. ochropis* Gmel., N. 18, 31.v, 23.ix. *Cratichneumon dissimilis* Gr., ♂ var. *punctifrons* Hlmgr. vertical orbits black, N. 25.v. *C. fabricator* F. Hlmgr., ♂ R. 2.vii. ♂ var. *impugnator* Wesm., N. 13.v.11. vi. W. 25.viii. *C. versator* Thunb. (*pallifrons* Gr.), ♂ N. 13. 18.v. *C. fugitivus* Gr., ♂ W. 10.viii. *C. albilarvatus* Gr., ♂ N. 13.18.26.v. *C. ruficeps* Gr., ♂ N. 7.13.v. *Melanichneumon monastagon* Gr., var. *luctuosus* Gr. ♂, N. 25.v, 14.vi, 25.viii, 6.ix, W. 10.viii. *M. sanguinator* Rossi, ♂ N. 27.viii. *Barichneumon vacillitorius* Gr., ♀ N. 6.v, 24.25.27.viii, 3.6.ix; roadside, hill and demesne, mostly on Umbelliferae, numerous. *B. deceptor* Gr. (*vestigator* Wesm.) ♂ N. 3.ix, hill on *Daucus Carota*. *B. lepidus* Gr., ♀, Newry, in street, 1.viii.1927. *Ichneumon deliratorius* L., ♂ W. 6.vi. *I. sarcitorius* L., W. 25.viii. *I. latrator* Fab., ♂ W. 24.vii; R. 23.27.28.vii; N. 17.viii. *I. subquadratus* Thoms., ♂ N. 27.vii. *I. gratus* Wesm., ♂ N. 25.v. *I. bucculentus* Wesm., ♂♂ W. 12.ix; R. 28.vii. *I. suspiciosus* Wesm., ♂ W. 27.viii. *I. stramentarius* Gr., N. 29.vi; R. 28.vii. *I. extensorius* L., ♂ W. 24.27.vii, 17.viii; R. ♀ small, 8 mm., 8.vii. *I. tempestivus* Hlmgr., ♂ N. 11.vii, 17.viii; R. 8.vii. *I. macrocerus* Thoms., ♂ W. 24.vii. *I. gracilicornis* Gr., ♂ W. 24.viii. *I. emancipatus* Wesm., ♂ R. 20.vii; W. 17.viii. *Chasmodes motatorius* Fab., ♂, scutellum black, W. 27.viii. *Amblyteles palliatorius* Gr., ♀♀ N. 31.v; ♂ 17.ix. *A. litigiosus* Wesm. (*culpatorius* Gr.), ♂ N. 17.vi; W. 17.viii. *A. armatorius* Forster (*fasciatorius* F.), ♂ N. 9-27.viii; W. 3.vii. *A. subsericans* Gr., ♀ N. 17.viii. *A. xanthorius* Forster, ♂ N. 25.viii. *A. oratorius* F. var. *atramentarius* Gr., ♂ N. 17.ix. *Platylabus iridipennis* Gr., ♂ N. 11.vi. *Herpestomus brunnicornis* Gr., ♂ N. 8.x. *Phaeogenes melanogonus* Gmel., ♂ N. 25.viii. *Ph. ruficoxa* Thoms., ♂ N. 17.ix. *Ph. ischiomelinus* Gr., N. 27.viii. *Ph. nigridens* Wesm., ♂ N. 27.viii.

Oiorhinus pallipalpis Wesm., ♂ R. 11.14.25.vii. *Dicaelotus pumilus* Gr., ♂ R. 18.vii. *Colpognathus celerator* Gr., ♂ R. 3.viii. *Alomyia debellator* Fab., ♀ Dk. 12.vii; var. *nigra* Gr., ♂ W.18.viii.

CRYPTINAE.—*Plectocryptus arrogans* Thoms., ♂ W. 12.18.viii. *Cratocryptus leucopsis* Gr., R. 28.vii. *Cubocephalus nigripes* Strobl., ♂ N. 9.ix. *Microcryptus improbus* Gr., ♀ N. 25.viii; ♂ R. 8.vii. *M. sericans* Gr., ♂ R. 23.vii. *M. assimilis* Gr. (*distans* Thoms.), ♂ R. 9.vii; Dk. 14.vii. *M. nigrocinctus* Gr., ♂ N. 5.ix. *M. curtulus* Kriech., ♂ N. 18.v. *Acanthocryptus 4-spinosus* Gr., ♂ Dk. 15.vii. *A. flagitator* Gr., ♂ W. 15.viii. *Stylocryptus profligator* L., ♀ Dk. 11.12.15.vii; R. 8.vii; W. 24.27.30.vii, 2.viii. *S. erythrogaster* Gr., ♀ R. 8.vii, *S. bispinus* Thoms., ♂ W. 12.ix, on thistles on Clonallon road. As far as I know, this species has not hitherto been recorded as British. *S. varipes* Gr., ♀ Dk. 14.vii; according to Morley (Brit. Ichn., ii.68), this is synonymous with *parviventris* Gr. *Phygadeuon rugulosus* Gr., ♂ N. 23.ix, 8.x. *Ph. mixtus* Bridg., ♀ W. 27.vii. *Ph. inflatus* Thoms., ♀ N. 9.ix. *Ph. flavicans* Thoms., ♂ N. 9.v, 4.vi, 29.ix, 15.x; ♀ R. 14.vii. *Leptocryptus* (*Panargyrops*) *claviger* Tasch., ♂ N. 13.v. *Hemiteles bicolorinus* Gr., ♀ N. 13.vi. *H. similis* Gmel., ♀ N. 25.x, on outside of window, 3 p.m.; weather stormy but mild; a number of Diptera about windows; ♂ N. 11.v. *H. laevigatus* Ratz., ♀ N. 27.viii. *H. hemipterus* F., ♂ N. 12.13.v. *H. oxyphinus* Gr., ♂ N. 11.v. *H. fulvipes* Gr., ♀ W. 5.ix, in dining room window facing S.E. *Atractodes tenebricosus* Gr., N. 13.ix, in window; W. 13.ix, roadside; a curious coincidence of dates in two different places and years. *A. gravidus* Gr., ♂ N. 23.ix, Donard demesne, between 4 and 5 p.m. *A. fatalis* Först. (*compressus* Thoms.; *croceicornis* Hal., vide Roman, Ent. Tidsk., 1917), ♂ R. 22.vii. *Pycnocryptus peregrinator* L., ♂ N. 5.ix; W. 13.ix. *Spilocryptus abbreviator* F., ♂ R. 23.vii. *S. nubeculatus* Gr., ♀ R. 9.vii. *Gambrus tricolor* Gr., ♂ R. 23.vii.

PIMPLINAE.—*Ephialtes tuberculatus* Fourc., ♀ N. 25.v, 9.11.vi. *Pimpla nigriscaposa* Thoms., ♀ N. 16.ix. *P. brevicornis* Gr., ♂ ♀ N. 9.11.29.ix. *P. turionellae* L., ♂ W. 4.vi, 17.viii. *P. maculator* F., ♀ Dk. 14.vii; R. (in house) 8.vii; N. 7.25.v, 25.viii, 15.x; W. 2.20.vi, 24.viii. *P. brassicariae* Poda, ♂ ♀ N. 5.ix. *Glypta fronticornis* Gr., ♀ W. 30.viii. *G. ceratites* Gr., ♂ ♀ W. 24.27.vii, 2.16.18.viii, teratological ♂ W. 30.vii, with growth between right antenna and eye like the beginning of a third antenna. *G. similis* Bridg., ♀ N. 25.viii, rather small, 6 mm., fourth point of hind tarsi shorter than fifth. *G. femorator* Desv., ♀ R. 18.vii; hind femora black above. *G. mensurator* F. (*lugubrina* Hlmgr.), ♀ R. 30.vii. *G. scalaris* Gr., ♀ R. 18.vii. *Lissonota linearis* Gr., ♀ N. 9.16.ix. *L. bellator* Gr., ♀ N. 24.25.viii; 9.ix; ♂ Dk. 13.vii; var. *arvicola* Gr. (scutellum black), ♂ W. 15.viii. *L. irrigua* Thoms., ♀ R. 23.vii. *L. clypeator* Gr. (*commixta* Hlmgr.), ♂ N. 25.viii. *L. cylindrator* Vill., ♀ W. 21.viii. *L. basalis* Brischke, ♀ ♂ N. 9.ix; W. 20-30.viii, 1.15.ix. *L. sulphurifera* Gr. (*fundator* Thunb.), ♀ N. 23.viii; ♂ W. 30.viii, 15.ix. *L. variabilis* Hlmgr., ♀ N. 25.viii; 15.ix. *L. trochanteralis* D.T., ♀ N. 6.16.ix, 8.x. *L. femorata* Hlmgr., ♀ W. 30.vii. *L. errabunda* Hlmgr., ♀ R. 23.vii. *Phytodiaetus gelitorius* Thunb. (*coryphaeus* Gr.), ♀ N. 27.viii. *P. geniculatus* Thoms., ♀ N. 7.13.vi, flying round young oak trees. *Lampronota caligata* Gr. (*nunciator* F.), ♂ N. 27.viii. *Banchus volutatorius* L., ♂ W. 2.viii. *Exetastes nigridens* Gr. var. *illusor* Gr., R. 30.vii; W. 30.vii, 15.viii.

TRYPHONINAE.—*Chorinæus cristator* Gr., ♀ Dk., 14.vii. *Exochus affinis* Hlmgr., ♀ R. 30.vii. *Picrostigeus anomalus* Hlmgr., ♂ N. 9.v. *Bassus tricinctus* Gr., ♂ R. 6-9.vii. *B. variicoxa* Thoms., ♀ W. 2.viii. *B. annulatus* Gr., ♂ Dk. 14.vii; ♀ W. 20.vi. *Homocidus cinctus* Gr., ♂ N. 8.x. *H. pectora-*

torius Gr., ♂ N. 25.v, 9.vii; var. *nigrithorax* Strobl., ♂ N. 18.v. *H. biguttatus* Gr., ♀ W. 27.viii. *H. tarsatorius* Panz., ♂ W. 10.viii; areolet present in right wing, absent in left. *H. fissorius* Gr., ♀ R. 5.vii. *H. nigritarsis* Gr., ♂ R. 27.vii; ♀ W. 20.viii. *H. pictus* Gr., ♀ N. 10.viii, 22.ix. *H. signatus* Gr., ♂ W. 16.viii. *Promethus sulcator* Gr., ♀ R. 5.vii; ♂ ♀ W. 17.30.viii, 12.ix. *P. cognatus* Hlmgr., ♂ N. 23.ix. *P. pulchellus* Hlmgr., ♂ N. 11.vi. *Sphecophaga vesparum* Curt., ♀ N. ii.vi. *Alexeter fallax* Hlmgr., ♂ Dk. 12.vii; R. 3.4.viii. *A. sectator* Thoms. (*ruficornis* Gr.), ♀ Dk. 15.vii. *Scopesus bicolor* Gr., ♀ N. 30.viii. *S. tegularis* Thoms., ♂ N. 17.27.30.viii; var. with yellow markings on shoulders; *vide* Schmiedeknecht, Opusc. Ich., p. 2931, 'schultern mit gelben flecken.' *S. rufonotatus* Hlmgr., ♂ N. 9.viii. *Synodites notatus* Gr., ♂ Dk. 14.vii, dark, ♀ 15.vii; R. 11.vii. *Scopesus macropus* Thoms., ♂ N. 17.viii. *Coeloconus elongator* F., ♀ N. 9.17.27.viii; W. 16.viii, 15.ix. *C. brachyacanthus* Gmel., N.; ♂ 11.viii, ♀ 25.viii. *Tryphon trochanteratus* Hlmgr., ♀ R. 23.vii. *T. signator* Gr., N. ♂ 9-23.vi, ♀ 29.vi. *T. subsulcatus* Hlmgr., ♀ N. 23.vi. *Hadrodactylus* (*Mesoleptus*) *typhae* Fourc. var. *femoralis* Hlmgr., ♂ W. 2.viii. *Mesoleptus prosoleucus* Gr., ♂ N. 9-19.viii. *Catoglyptus fortipes* Gr., ♂ W. 20.vi. *Hypamblys buccatus* Hlmgr., ♂ N. 28.v. *Perilissus filicornis* Gr., ♂ N. 19.viii. *Polyblastus pratensis* Gr., ♀ N. 11.vi. *P.* (*Scopiorus*) *arcuatus* Hlmgr., ♂ N. 24.viii; var. hind femora red, Dk. 15.vii. *P. albicoxa* Thoms., ♀ N. 11.vi.

Ophioninae.—*Campoplex rugifer* Först., ♀ N. 16.ix. *C. oxyacanthae* Boie., ♀ N. 24.v, 11.vi; ♂ R. 4.vi.1928; taken on mountain by R. G. Atkinson. *C. confusas* Först., ♀ N. 17.29.ix. *C. zonellus* Först., ♀ N. 6.ix. *C. disclusus* Först., ♀ N. 9.ix. *Sagaritis agilis* Hlmgr., ♂ N. 9.v; R. 28.vii. *S. declinator* Gr., ♀ R. 8.23.vii. *S. femoralis* Gr., ♂ N. 9.18.25.v; var. 1, Holmgren, hind femora red. *S. holmgreni* Tasch., ♂, ♀ N. 7-31.v, 11.vi; R. ♀ 14.15.vii; var. ♂, hind femora red, N. 30.v. *S. postica* Bridgm., ♀ R. 23.vii. *S. punctata* Bridgm., ♂ N. 6.v; R. 8.27.vii. *S. maculipes* Tschk., ♂ N. 17.viii. *S. latrator* Gr., ♂ N. 9.v. *S. crassicornis* Tschk., ♂ ♀ N. 9.v, 13.vi. *S. varians* Thoms., ♂ N. 7.v, 25.viii. *Casinaria albipalpis* Gr., ♂, N. 12.v. *C. ischnogaster* Thoms., N. ♂ 9.v; ♀ 8.x. *Limnerium rufifemur* Thoms., ♀ N. 6.ix. *L. xanthostoma* Gr., ♀ R. 2.5.vii. *Omorga cursitans* Hlmgr., ♂ W. 28.v. *Olesicampa crassitarsis* Thoms., ♂ W. 2.viii. *Pectenella latungula* Thoms., ♀ W. 10.viii. *Angitia alternans* Gr., ♂ N. 6.v. *A. rufipes* Gr., ♀ W. 27.vii, 18-30.viii, common on thistles. *A. claripennis* Thoms., ♂ N. 18.v. *A. majalis* Gr., ♂ N. 6.v. *A. fenestralis* Hlmgr., ♂ N. 12.25.v, 5.23.ix, 15.x; W. 10.viii. *A. chrysosticta* Gmel., ♂ N. 6.v, 11.viii, 17.ix; W. 16.viii. *A. cerophaga* Gr., ♂ N. 18-26.v, 25.viii. *A. tenuipes* Thoms., ♂ ♀ Dk. 12.15.vii; R. 2-23.vii; N. 6-25.vi, 12.viii, 23.ix, 8.15.x. *A. armillata* Gr., ♂ N. 6.12.v, 5.ix; R. 14.vii; W. 10.viii, ♀ 30.vii. *A. interrupta* Hlmgr., ♂ N. 7.v. *A. exareolata* Ratz., ♀ W. 3.vii. *A. combinata* Hlmgr., ♂ N. 2-5.ix. *A. trochanterata* Thoms., ♂ N. 25.v. *Anilasta notata* Gr., ♂ N. 25.v. *A. alienus* Brischke., ♂ N. 26.v, 25.viii. *A. thuringiaca* Schm., ♀ N. 16. ix. *A. discedens* Schm., ♂ R. 4.viii. *A. tricincta* Hlmgr., ♂ ♂ N. 6.v, 13.18.27.vi. *A. boops* Thoms., ♂ N. 7.v; ♀ 8.x. *Holocremna buccatus* Thoms., ♂ N. 18.v, ♀ 13.vi. *H. hyalinata* Hlmgr., ♀ N. 17.ix. *Labrorhynchus nigricornis* Wesm., ♀ N. 29.ix. *Ophion mocsaryi* Brauns., ♀ R. 8.vii.1927, 24.vii.1928. *O. luteus* L., ♀ R. 16.20.ix. 1928. *Mesochorus confusus* Hlmgr., ♂ Dk., 14.vii. *M. tachypus* Hlmgr., ♀ R. 14.vii.

Rostrevor, Co. Down.

April 23rd, 1929.

SOME REMARKS ON PAEDOGENESIS IN GALL-MIDGES (*CECIDOMYIDAE*).

BY H. F. BARNES, B.A., PH.D.
Entomological Department, Rothamsted Experimental Station.

Paedogenesis in gall-midge larvae was discovered by Wagner in 1861, and confined by Meinert in *Miastor metraloas* Mein. in 1864. Later it was found in *Oligarces paradoxus* Mein., *Meinertomyia* (*Pero*) *fasciata* Mein. and other species. Various Continental writers, such as Pagenstecker, Mecznikoff, Ganin and Leuckart studied this phenomenon. R. G. Harris in America and E. Gabritschevsky in France have recently been studying it from the experimental standpoint. Besides occurring in these genera, Kieffer came to the conclusion that *Frirenia tenella* Kieff. and *Leptosyna acutipennis* Kieff. also reproduced by paedogenesis on account of the large eggs he observed in the abdomens of the females. Dr. Feld has studied paedogenesis in the genus *Miastor* in America, while the late Dr. Withycombe found larvae, and adults were subsequently reared, of *M. hastatus* Kieff., reproducing paedogenetically in Epping Forest. Messrs. Bagnall and Harrison have recorded larvae of *Miastor* sp., while F. V. Theobald and the writer have found larvae of this genus or else a closely related one reproducing paedogenetically in this country in mushroom houses.

It is to be noticed that all these midges are xylophiles in the larval stage, and belong to the subfamily Heteropezinae.

The object of this note is to point out that paedogenesis also occurs in the group *Campylomyzariae* of the subfamily Lestreminae.

The writer in 1927 described *Mycophila* (*Pezomia*) *speyeri* (Barnes) from midges bred by Mr. E. R. Speyer from mushrooms at Cheshunt. A single larva (Cecid. 1,038) collected from this material at the same time the midges were emerging possessed a trilobed anchor process. The female midges (Cecid. 380, 446) contained 4—5 large eggs. This suggested that the larvae were paedogenetic. In 1928, Mr. T. H. Taylor sent a female midge, together with paedogenetic larvae, to Mr. F. V. Theobald, who very kindly passed them on to the writer. This adult (Cecid. 1,268) is certainly a *Mycophila* species. The larvae (Cecid. 1,275, 1,323—27) were giving rise to larvae when received in August, and as many as twenty were observed to arise from one mother larva. None of the progeny, however, were found to possess anchor processes, and unfortunately the stock died out prematurely in early November. The larvae were originally found in decaying potato leaves, in-

fested with eelworm, near Leeds. It is to be supposed that these larvae without anchor processes would have reproduced paedogenetically throughout the winter, as they did till November, and in the spring or early summer have given rise to larvae with anchor processes, which in turn would have developed into adult midges.

Recently, Dr. Mathias Thomsen, of Copenhagen, has submitted for identification female midges (Cecid. 1,375) reared from larvae found in decaying mushrooms at Genofta, Denmark. He has stated (*in litt.*) that the larvae were paedogenetic. The midges are almost certainly *Mycophila speyeri.*

In addition to these three observations of the genus *Mycophila*, captured specimens of the closely related *Pezomyia vanderwulpi* Meij. (Cecid. 1,039, 1,040), found at Adel, near Leeds, in September, 1927, crawling over a rotten tree stump (hazel?), show the large eggs so typical of paedogenesis.

It appears very likely that paedogenesis is far more common among genera of the subfamily Heteropezinae and the group *Campylomyzariae* than is at present known.

Rothamsted.
May 2nd, 1929.

Random notes from the New Forest.—When I went down to Brockenhurst on May 8th I found that the Forest, especially in those parts where oak is the prevailing tree, presented an aspect not differing greatly from that of late winter. The oaks were still practically bare, and the leaves of the beech and birch trees were at most about half-developed; the blackthorn blossom had only just reached its maximum, a few lingering flowers persisting to quite the end of the month; while the primroses, wood-anemones, dog-violets and other flowers of early spring were as abundant and fine as they usually are in mid-April in a less abnormally backward season. Recent heath fires, too, had devastated many hundreds of acres of the open Forest, and the blackened stems of the gorse, heather, and small pines presented an aspect dreary and depressing in the extreme.

The Forest struck one as peculiarly lifeless at this time, even the usual 'plague of flies' being absent. Except for a good many hibernated *Gonepteryx rhamni*, and a few *Pararge aegeria* in the woodland rides, hardly a butterfly was to be seen at first, but a few *Euchloë cardamines* and *Brenthis euphrosyne* somewhat enlivened the scene towards the end of my visit.

In Coleoptera, *Carabus arvensis* (including the most brilliant green variety I have ever met with), *C. nitens*, and *Pterostichus dimidiatus* occasionally put in an appearance on the pathways, but I found that the usually productive sandpits at Matley Passage and Longdown Heath were almost non-existent as such, and the latter locality gave me only three very fresh examples of *Caenopsis fissirostris.* Such workable timber as could be found produced the usual run of small bark- and wood-frequenting beetles, as well as a nice series of *Elater miniatus* in very rotten oak; *E. lythropterus* was by no means common, and *E. sanguinolentus* had practically disappeared from the locality near Brocken-

hurst where in former years it used to abound at this season, while *E. elongatulus* was represented by a single specimen found on my daughter's hat. *Pyrochroa coccinea* was just coming out sparingly at the end of my visit, and the May-blossom was sufficiently advanced on my last day to give me a nice series of *Ischnomera sanguinicollis* at Bank, which is apparently the headquarters of this species in the Forest. One *Colydium elongatum* turned up at an oak log containing *Platypus*, *Xyleborus dryographus*, etc.; and towards evening on May 27th my daughter called my attention to a fine example of this rarity, walking on a window-sill facing the open Forest at 'West View'—surely the most 'flukey' capture of *Colydium* on record! I have now taken *Colydium* in spruce-fir, oak, birch, and beech, most frequently in the last-named tree, and some years ago the late Dr. Sharp found it in numbers in a holly stump, so it may evidently be looked for in almost any kind of timber affected by Scolytidae. I got *Scydmaenus exilis* rarely with *Ocyusa incrassata* (seen by me in plenty for the first time) out of the moss clothing a large prostrate beech-trunk, but working *Sphagnum* gave me little beyond one *Megacronus cingulatus*, which I had not previously met with in the Forest.

A visit to the coast at Milford on May 21st was not very remunerative, except for the recently described *Bledius praetermissus* (*anteà*, p. 28), which could be taken in almost any number in the patches of fine sand on the face of the cliffs.—James J. Walker, Oxford: *May 30th*, 1929.

Ilybius guttiger Gyll. in the London district.—I found this species in some small numbers in crevices and amongst damp refuse at the sides of a dried-up pond in Epping Forest in September last. I do not know of any published record of its occurrence further south than the Norfolk Broads (Balfour-Browne). A single example of the species was, however, taken by the late Mr. Newbery as long ago as June, 1892, at Walthamstow, a district adjacent to the Forest, and is included, together with a record from Lee pit (West), in Mr. H. Heasler's MS. List of London District Coleoptera, compiled in 1895, so that, being acquainted with these records, I was not altogether surprised to meet with it. I may add that Mr. K. G. Blair, who has seen some of the specimens, agrees in their determination. *I. guttiger* was represented in the Power Collection only by some very ancient pinned examples.—F. B. Jennings, 152 Silver Street, Upper Edmonton, N.: *May 11th*, 1929.

Society.

Entomological Society of London: *Wednesday, April 3rd*, 1929.—Dr. K. Jordan, President, in the Chair.

The President announced the death of the Rev. A. E. Eaton, M.A., a Fellow of the Society.

The following were elected Fellows of the Society: Dr. Walther Horn, 20 Gossler Strasse, Berlin-Dahlem, Germany, and P. G. Shute, Malaria Laboratory, Ministry of Health, Whitehall.

The President exhibited and made remarks on a Brazilian sand-flea, *Tunga caecata* Enderl. Mr. H. M. Edelsten exhibited a specimen of *Lithophane semibrunnea*, found dead in its resting attitude. Professor E. B. Poulton, F.R.S., communicated: (1) Notes by a number of observers on birds as the enemies of butterflies. (2) Field notes on *Euxanthe wakefieldi* Ward and some South African species of *Charaxes* on behalf of Mr. H. Cecil Kenway, F.E.S. (3) The specimen of *Pangonia varicolor* Wied, referred to by Burchell in 1813. (4)

Helicoptera longiceps Fowl., a tropical American Homopterous insect with an apparent head at the posterior end, observed by Dr. J. G. Myers. Dr. F. G. Holdaway exhibited and made remarks upon the Queensland pink Bollworm, *Pectinophora scutigera* Hold.—S. A. NEAVE, *Hon. Sec.*

THE MATING HABITS AND OVIPOSITION OF CRANE-FLIES.

BY ALEXANDER CUTHBERTSON.

In this paper the writer has summarised data from the scanty literature and from field notes made in the years 1922-26 on the mating and oviposition of Crane-flies in the West of Scotland. Alexander (1920, pp. 710-714) gives an excellent account of the mating habits, etc., of these insects in the New World, and refers briefly to European work by Mik (1882, 1886), Giard (1895), and Muggenberg (1901). Pierre, in his monograph on the taxonomy of the adults, discusses the subject shortly. Since 1921, several notes by Saunt, Barnes and the present writer have appeared.

THE MATING HABITS.

As far as known, crane-flies usually are sexually mature at emergence from the pupa stage; and fertilisation is effected almost at once, no preliminary feeding taking place except in the genera *Ptychoptera*, *Toxorhina*, and *Geranomyia*, which frequent flowers in search of nectar. Males generally appear before the females, and wait until the latter emerge, becoming greatly stimulated as their mates creep from the pupal exuvia. This procedure is recorded for *Dicranomyia trinotata* Mg., *Limonia nubeculosa* Mg. observed by the writer in *Ptychoptera* and *Poecilostola*, and recorded in *Cylindrotoma* by Mik. Although in some genera, as *Anisopus*, *Dicranomyia* and *Erioptera* the air is the normal place for copulation, a very large number of crane-flies of the genera *Limonia* (according to Barnes), *Pilaria*, *Pedicia*, *Nephrotoma*, *Tipula*, etc., do not swarm for the purpose of pairing. Males of these genera presumably find their mates by sight, though there is at least one record of the use of the legs in a tactile function, *i.e.* *Dicranomyia simulans* Walk., which locates the female by touch of the slender fore-tarsi (Needham 1908, quoted in Alexander, 1 c., p. 821). The writer has noted that copulation may take place at all times of the day in *Tipula oleracea* L., but most field observations refer to finding mated flies in the late afternoons or at dusk. *Tipula pagana* Mg. males flutter at sunset low over long grass, searching for the teneral subapterous females which rest there. Also, a small percentage of the crane-flies attracted to

lighted windows are coupled in pairs, or are gravid females easily induced to oviposit in captivity, which indicates a crepuscular period for these activities (writer, 1926 c.).

Sexual Movements. The behaviour during copulation is little known. The writer often has watched mature males of *Poecilostola punctata* Schrk. caressingly touch the females with the tips of tarsi and antennae as they emerge from the pupal exuvia. Certain actions which may be described as courtship have been recorded, e.g. Barnes observed that *Limonia* males whilst *in copulâ* played 9-12 short tattoos with his fore-legs on the female thorax; and Rennie (1916) mentions the quivering of antennae and halteres of *T. paludosa* during coitus.

Sexual Selection. Barnes maintains that this occurs in *Limonia*; but the subject has not been studied specially by any other observer.

Modes of Copulation. In the genera *Ptychoptera, Limonia,* some *Limnophila, Phalacrocera, Prionocera,* and *Tipula,* the act of pairing is easily seen; and Barnes and Rennie have published detailed observations on flies in captivity. The male generally alights above, or at the side of, the female and appears to be greatly stimulated. He holds her by his legs, and bending his abdomen downwards almost vertically, seizes the slightly upturned genitalia of his mate, by means of two chitinised processes of the hypopygium rightly called 'claspers.' The female rests passive, and the male has little difficulty in inserting the penis. At this stage both abdomens move convulsively. After some time, which varies with the species—about a minute in *Erioptera,* if undisturbed, and 30 to 60 minutes or longer in *Tipula*—the female walks or attempts to fly off, dragging the male, twisting and turning in his efforts to disunite. Many Tipulines remain *in copulâ* for over three hours, the female resting with her fore-tarsi on a support, and bearing the whole weight of the male, which hangs head downwards with outstretched legs and wings, especially noticeable in *Dolichopeza albipes* Ström. Rennie (1916; Pl. xxxvi) illustrates by photograph the primitive 'tail-to-tail' pairing of *T. pauldosa.*

Phenomenon of Swarming. The writer (1925, p. 240; 1926, p. 37) has described the swarming of the genera *Trichocera* and *Erioptera,* and listed over forty species which congregate in dancing groups towards evening, preparatory to, or for the purpose of, copulation. In many swarms only males have been found, e.g. in some *Trichocera, Molophilus* (according to F. W. Edwards in

course of conversation), and *Ormosia* in Britain, and observed in *Epiphragma, Dicranota, Rhaphidolabis,* and *Rhabdomastix* in America by Alexander. The females of such species rest in near-by vegetation.

The Nuptial Fight. Males generally predominate in the swarms, and a newly-arrived female is actively competed for, the males jostling one another as they chase the female in a curious vertical up-and-down flight (e.g. in *Trichocera*), or figure of eight fashion, as in *Limnophila.* After a few minutes or longer, the female is captured and held by a successful male. The flight is impeded by his efforts to clasp, and the couple descend slowly to the ground, or a twig as support, to which the female clings by the fore and/or mid-tarsi. Usually the pairing lasts but a few minutes, the male releasing himself and rejoining the swarm.

Sexual Intercourse. Polygamy and polyandry are very common. The female of *Tipula, Pachyrrhina,* and *Prionocera* copulate after each batch of mature eggs is laid. Rennie records copulation of an individual male of *T. paludosa* seven times in two days, and a female six times in two days with three different individuals.

Attempting copulation between the sexes of different species is commented upon by Pierre (1924), and recorded by Alexander between *Phalacrocera tipulina* O.-S. and *Liogma nodicornis* O.-S. (Mem. 25, Cornell Univ. Agri. Exp. Sta. 1919, p. 881), and by Edwards between *Dicranomyia columbina* Brun. and *Erioptera ornatifrons* Edw. (Spolia Zeylanica, xiv, p. 123; 1927).

OVIPOSITING HABITS.

There is considerable variation in the commencement of egg-laying after fertilisation, e.g. in *Erioptera taenionata* Mg. it is 15 to 40 minutes, in *Tipula paludosa* about an hour, and in *Liogma glabrata* Mg. over 12 hours. Some crane-flies take deliberate care to oviposit eggs firmly in a suitable nidus, e.g. beneath the surface covering of leaves in woods. Others, as *Tipula staegeri* Niel., let fall the eggs as they fly close to moss-covered tree-trunks. *Phalacrocera* and *Liogma* lay their eggs on the mosses and other plants which serve as food to the larvae. The structure of the female genitalia of certain crane-flies, as *Molophilus, Ormosia, Limnophila, Tipula,* etc., indicates a specialised method of oviposition; and in this connection it is pertinent to call attention to the full account of the endophytic oviposition of *Cylindrotoma splendens* in Canada by Cameron (1918). Species which are sub-aquatic in the pre-imaginal stages, as *Pedicia, Tricyphona,* etc.,

oviposit in the soft mud at the margins of streams. Regarding the strictly aquatic genera, as *Dicranota, Hexatoma* (e.g. *H. megacera* O.-S.), the eggs are laid (probably) as the female flies low over and dips to the surface of the water (Alexander, pp. 878-879), a habit which the present writer has repeatedly observed in *Tricyphona* and *Tipula* at the Loch Humphrey burn at Duntocher (near Glasgow).

Procedure of Oviposition. Barnes has described the procedure in *Limonia* and *Dicranomyia chorea* Mg., Saunt (1921) in *Nephrotoma (Pachyrrhina) crocata* L., and Rennie in *Tipula.* The method in the majority of species of soil-inhabiting crane-flies may be described as follows. Having selected a suitable site, the insect deposits her eggs singly by thrusting the acute terminal abdominal segments about 5 mm. into the soil, the hind-body being turned down almost vertically during the process. This is not done in some Tipulae (as *T. luteipennis* Mg.), and in *Prionocera turcica* F., which drop eggs as they fly low over herbage. Rennie mentions a screwing motion of the abdomen of *T. paludosa,* as if difficulty was experienced in forcing the ovipositor through the soil.

In some *Dicranomyia* (as *D. chorea*) a preliminary 'bouncing' or bobbing of the body in quick succession has been observed (Barnes), the abdomen being held horizontally. About twenty such bounces are made, and then the abdomen is depressed vertically downwards and pierces the soil, an egg being laid at each bounce. But this bobbing is not always associated with oviposition, as will be explained later.

Duration of Egg-laying. Crane-flies lay a very large number of eggs, varying from about 50 to 100 in *Erioptera,* 400 to 500 in *T. oleracea,* more than 500 in *Ptychoptera albimana* F. (according to Topsent), and about 2,000 in *Eriocera spinosa* O.-S. (according to Alexander, 1920; p. 714). The eggs do not all come to maturity at the same time, but are deposited in several batches in the course of two or three days, the female readily pairing after laying each batch of eggs. If undisturbed, females will deposit all the eggs within a very small area, e.g. a few square feet in *Limonia tripunctata* Mg., *Poecilostola,* etc. The females soon die after completing oviposition, usually only a few days.

Bobbing whilst Resting or Feeding. Edwards (1921), Barnes (1924), and the writer (1926B), have recorded the bobbing of *Dicranomyia chorea, Idioptera marmorata* Mg. and *D. autumnalis* Staeg respectively, while at rest beneath leaves, projecting rocks in cliffs, etc. The writer has also observed the habit in *D. didyma*

Mg. and *D. stigmatica* Mg. in the west of Scotland. In South Africa, H. K. Munro has seen the bouncing at rest of *Trentepohlia humeralis* Alex. (quoted by Alexander, p. 943), and the writer noted this habit in *Helius capensis* Alex. and a *Geranomyia*, on alga-covered rocks in the Umtali highlands of Rhodesia.

Regarding the bobbing of nectar-feeding crane-flies, Rogers (1926), in Florida, who studied *Geranomyia rostrata* (Say), states that the bouncing is effected by the 'extension and flexing of the legs . . . like "deep-knee-bend" of setting up exercises,' the elongate rostrum penetrating the florets on its downward movement.

REFERENCES.

ALEXANDER, C. P. (1920). The Crane-flies of New York. Pt. II, Biology and Phylogeny. Mem. 38. Cornell Univ. Agric. Exp. Station.

BARNES, H. F. (1924). Some Observations on the Mating Habits and Oviposition of the Limnobiidae (Dipt.) I. Ent. Mo. Mag. lx, pp. 71-73.

CAMERON, A. E. (1918). Life History of the leaf-eating crane-fly, *Cylindrotoma splendens* Doane. Ent. Soc. Amer. Ann II, pp. 67-89.

CUTHBERTSON, A. (1925). 'Crane-flies (Daddy-long-legs).' Countryside. (VI) 8, pp. 239-242.

——— (1926 A). The Swarming of Crane-flies. Ent. Mo. Mag, lxii, pp. 36-38.

——— (1926 B). Crane-flies of the Inner Hebrides. Scot. Nat., pp. 53-58 (Mar.-Apr.).

——— (1926 C). Some Photophilous Crane-flies. Entom. lix, pp. 127-128.

EDWARDS, F. W. (1921). Resting Positions of some Nematocerous Diptera. Ent. Mo. Mag. lvii, p. 26.

PIERRE, C. (1924). Faune de France. 8. Diptères, Tipulidae, pp. 11, 73. P. Lechevalier, Paris.

RENNIE, J. (1916). On the Biology and Economic Significance of *Tipula paludosa*, Pt. I. Ann. App. Biol. 11, 4, pp. 235-240 (Pl. xxxvi).

ROGERS, J. S. (1926). Some Notes on Feeding Habits of Adult Crane-flies. Florida Entomologist x, No. I, pp. 5-8.

SAUNT, J. W. (1921). Ovipositing of *Pachyrrhina crocata* L. Ent. Mo. Mag. lvii, p. 186.

Box 387, Southern Rhodesia.
April, 1929.

Pyrameis atalanta L.—Migratory or Hibernated?—Visiting Bagley Wood, near Oxford, on the afternoon of April 27th last, in quest of early spring Diptera, it was with much surprise that I saw a fairly fresh-looking specimen of the above-named butterfly feeding at the blackthorns, then in full bloom. It continued to feed from flower to flower for about half an hour, and then flew up among the oaks. If approached too closely the butterfly would immediately fly to a higher part of the bush, being very shy and wary. In all my fifty years' experience I have never seen *P. atalanta* at so early a date as this.—A. H. HAMM, 22 Southfield Road, Oxford: *May*, 1929.

SOME ASPECTS OF MODERN METHODS IN ENTOMOLOGY.

BY G. V. HUDSON, F.E.S., F.N.Z.INST.

1. THE CREATION OF NEW ORDERS OF INSECTA.

In 1925, Mr. E. E. Green gave a most interesting address to the Entomological Society of London on the Insects of Ceylon. In dealing with this subject he mentioned at the outset, that for convenience he was following the classification of insects given by Dr. Sharp in the 'Cambridge Natural History.' This remark from such an experienced worker as Mr. Green, was of great interest to me, as it appeared to confirm an opinion I had formed for many years, that the more complicated classification at present widely in vogue was both inconvenient for general purposes, and failed to set out clearly the natural affinities of the organisms classified.

The difference between the new classificatin and the old mainly consists in the raising to ordinal rank of the old families of the Linnean Neuroptera, and also a similar raising in status of certain divisions of the heterogeneous order Aptera. In my opinion, it would be far better to retain both Neuroptera and Aptera in their old sense, and treat their primary divisions as suborders. The breaking up of the old Linnean Neuroptera into a number of distinct orders, mainly on the grounds of differences in metamorphosis, has resulted in the separation of many primitive forms which, being low down in the scheme of descent exhibit, apart from their metamorphoses, many points in common. Darwin warned us that the characters of larvae, being highly adaptive, should never be used for purposes of classification, but those who are responsible for the elevation of such groups as the Stoneflies, Lace-wings, Termites, and Mayflies to ordinal rank have clearly disregarded his excellent advice. The modern worker unwittingly admits the validity of the Linnean order Neuroptera, when he constantly has to refer to it under the clumsy title of 'Neuropteroid Insects.' He also makes confusion worse confounded by calling the section Planipennia 'Neuroptera.' The terms Plecoptera and Plectoptera for stoneflies and mayflies respectively is yet another instance of modern ineptitude. If differences in metamorphosis are to be regarded as of ordinal value, why should not those species which exhibit hyper-metamorphosis be placed in distinct orders? Without going into further details, which would be out of place in an article of this kind, I trust I have shown some reasons why the multiplication of insect orders, advocated by certain modern entomologists, should not be followed.

It is, perhaps, almost superfluous for me to add that the same vicious principle of endless subdivision is revealed in the unnecessary creation of new families, genera, etc., and that many modern workers seem to imagine that classification merely consists of the repeated subdivision of well-defined existing groups. They appear to forget that a classification, if it is to be of any permanent use or value, must embrace an easily understood grouping together of allied forms, not merely an endless splitting up of well recognised divisions.

2. THE CONTINUAL ALTERATIONS IN NOMENCLATURE.

The alterations in nomenclature, which have been so constant during recent years, are, in my opinion, a hindrance to the progress of true science, and such alterations should be kept at an absolute minimum. The Law of Priority in naming should be leavened with common sense, and names which have been in constant use for fifty years, and thus appear in much literature, should not be displaced by the resuscitation of long-forgotten names, which may happen to have priority. Again, terminations which have been in constant use for over fifty years, such as -ides for subfamilies in insects, should not be altered merely on the resolution of a conference.*

The trinominal system is undesirable, because the question of naming forms of inferior status to the subspecies is bound to arise, and all finality will be lost. For this reason I consider the binominal sysytem should be strictly adhered to.

Whilst it is claimed that the fixing of the rules of nomenclature by conferences and committees is being done in the interests of a fixed nomenclature, experience shows that far more alterations are being made now than when individual authorities were followed. The indisputable fact that the work of an individual is undertaken with a much keener sense of responsibility, than the work of a committee or conference, is not generally realized at the present time.

3. THE PRODIGAL USE OF GENITALIC CHARACTERS.

Descriptions and figures of genitalia are probably the most characteristic, and at the same time least interesting, features in modern entomological literature. Where formerly life-like figures of insects were given, intelligible to all, figures of genitalia are now substituted, these being apparently regarded as all-sufficient and highly scientific. In my opinion, much of the scientific pre-

* There is really no objection to a certain resemblance between the sub-family termination -ides, and the family termination -idae, as divisions, which one author regards as subfamilies, another author may consider worthy of full family rank.

cision claimed for this work on genitalia is illusory for the following reasons: A complicated solid object, such as the genitalia of a male insect, may be profoundly modified in appearance by a very slight difference in the angle at which it is viewed. Such modification is, of course, due to the foreshortening, by perspective, of certain parts of the structure compared with others. This effect of varying perspective will vitiate the accuracy of both drawings and photographs, and despite the greatest care, must produce many illusive differences. Whilst six skilled observers might reasonably produce absolutely identical representations of the neuration of an insect, owing to the ease with which a flat object may be viewed at the same angle, it is very doubtful if six identical figures of genitalia could be made by the same number of independent observers. I have never heard of a test of this kind having been successfully applied to the delineation and description of genitalia, but it is obvious that such a test is highly desirable from a scientific standpoint. We actually know that a simple object, like the ring of the planet Saturn, is profoundly modified in its appearance by a slight difference in the angle at which it is viewed. It is equally certain that a much more complicated object, like the male genitalia, would be even more affected by small variations in the angle at which it is observed. Again, differences in genitalia are usually regarded as indicative of specific differences only. If this be so, they must have originated comparatively recently, and much real variation may therefore be expected. Such variation would further vitiate their value for precise comparisons and determinations. It has also been proved, in certain cases, that differences in genitalia are not reliable for the separation of species —in the common primrose, for instance. Why, then, attach such great importance to differences in genitalia in insects? Finally, it must be admitted that it is always very inconvenient to have to dissect a specimen before we can arrive at its specific identity, and, in the case of investigations relating to the living insect, impracticable. This will always be a serious objection to the use of genitalic characters for the differentiation of species.

4. The extreme importance now ascribed to Type Specimens.

It is interesting to observe the great importance which so many modern workers ascribe to type specimens. Whilst it is of course very desirable that the type specimen, from which the description of a new species has been made, should be carefully labelled and preserved, the fact remains that if the description or figure has been properly drawn up, the species should always

be recognisable from these alone, without reference to the type. Despite all the laboured detail with which modern descriptions of new species are drawn up, it is clear that the authors themselves are sceptical as to their efficiency, and that the type specimen is therefore regarded as all essential for the accurate determination of the species. The older workers were not content to describe from single specimens, but described from all available material so that the element of variation (always more or less present) was adequately dealt with. Hence they relied on their figures and descriptions, and type specimens were frequently not selected, or specially labelled. This practice has been the subject of much adverse comment by moderns, but, in thus condemning the earlier methods, they do not appear to see that the logical outcome of the 'sanctity of the type specimen' is that figures and descriptions are unreliable, and that a species can only be adequately defined by the deposit of a labelled specimen, or type, in a museum.

5. The Multiplication of Technical Terms.

I consider that the modern tendency to use highly technical terms, where words in ordinary use will express the desired meaning equally clearly, should be sternly deprecated. Such terms as 'Macrotrichia' for bristles and 'Microtrichia' for hairs; 'Autochthonous' for aboriginal; 'Argillicoles' for clay-dwellers; 'Calcicoles' for chalk-dwellers, etc., etc., etc., are pedantic and absolutely unnecessary. The use of such terms does not in any way assist the reader to comprehend the subject under discussion, but rather the reverse. The practice can only be regarded as an attempt, on the part of an author, to impress the reader with the profundity of his own knowledge. The time has surely come when Learned Societies will have to consider whether the printing of highly technical and involved papers, intelligible only to the author and one or two of his intimate colleagues, is justified.

6. The failure properly to set Entomological Specimens.

There is a growing tendency amongst a certain school of modern entomologists to regard the careful mounting and setting of entomological specimens as 'unscientific,' and a 'waste of time.' The truth is that this frame of mind really arises from a lack of the necessary industry and ability to do the work, and a disregard of the convenience of others who may have to study their specimens afterwards. It goes without saying that if a specimen is worth keeping it is worth the five minutes required to set it properly. An unset specimen is a nuisance alike to the

entomologist, who has to identify it, and to the artist, or photographer, who has to figure it. I can testify, from personal experience, that the amount of time lost in trying to identify, or figure, an unset specimen is far greater than the time which it would have taken the collector to set the insect in the first case.

7. General Remarks and Conclusion.

In conclusion, it seems to me that the defects in modern methods, some of which I have endeavoured briefly to indicate in this article, are directly due to the increasing influence of the paid professional entomologist of the American type, as compared with the old-time unpaid British entomologist, who, for the sake of convenience, may be called the amateur. I think I am right in saying that the main ideal of the amateur entomologist was the advancement of the science for its own sake, irrespective of any economic gain to himself or others. This ideal was materialized in such objects as the formation of extensive and beautiful collections of insects; the publication of splendid illustrated books on various branches of entomology, intelligible to the general reader; the formation of societies for the exchange of views between advanced workers and beginners; and, above all, the enlistment of entomological recruits, and the fostering and encouragement of a love of nature for the pleasure it brings to mankind in general. Stainton may well be taken as typical of the best entomologists of the old school. On the other hand, the modern professional entomologist is mainly concerned in the combatting of insect pests, and all other activities are subordinated to this end. Although perhaps seldom or never referred to, the modern professional entomologist, notwithstanding his special training, has many disabilities and limitations which the amateur entomologist is free from. We have amongst others the following :—

(*a*) Lack of enthusiasm, brought about by over-study in early years, and the stereotyped ideals of the high school and university.

(*b*) Narrowness of outlook, due to the restriction of activities to problems of economic importance.

(*c*) Lack of originality, especially in the case of younger workers, who have to defer to the opinions of their official chiefs. I have seen many striking instances of this.

(*d*) Lack of appreciation of the philosophical and aesthetic side of the science, due to 'want of time' and 'the need for concentration on economic problems.'

(*c*) Fear to criticize the work or opinions of those in high places. The present unfortunate domination of scientific thought by committees and conferences is largely due to this limitation of outlook. Many of the younger entomologists think far more of a conference decision than of an eternal fact of nature.

(*f*) The unnecessary creation of new technical terms, new orders, families and genera in order to enhance the author's official reputation in the eyes of an over-credulous public.

(*g*) A striking inability to generalize, or to interpret the meaning of the facts of nature investigated.

In thus summarizing what appear to me some of the defects in method of the ever-growing army of professional entomologists, I desire to show that there is still ample scope for the amateur entomologist who has independent views and methods of his own. Untrammelled originality is just as necessary for the progress of science now as it was in pre-Darwinian days, and it is sincerely to be hoped that the present subordination of scientific opinion to the rulings of committees and conferences is a temporary phase only. Perhaps I may also be allowed to suggest, even to those who are solely interested in economic questions, that had opinions been obtained from some of the leading amateur entomologists, on questions such as the extermination of noxious weeds by insect agency, much unnecessary expenditure of public money would have been avoided.

This article, no doubt, will be dismissed by many as 'out of date' and the ideas contained therein as 'quite unsuited to modern requirements.' I am, however, supremely indifferent to criticisms of this kind. I should in no way esteem the concurrence of those who are guided by fashion alone, and are indifferent to logic, arguments, or theories based on the unalterable laws of nature.

Hill View, Karori, Wellington, New Zealand.
May 17th, 1929.

Unusual foods of Tinea pellionella L.—Mr. H. M. Hirst, of Scarborough, recently showed me a number of drugs and dried herbs which had been eaten by the larva of the above-named moth. As some of them are poisonous, and the remainder are apparently of a most inedible nature, it seems worth while to put them on record. They are as follows: Aconitum root, Cayenne pepper, horse-radish, Strophanthus (used as an arrow-poison in East Africa), Indian hemp (*Cannabis sativa*), cherry-laurel leaf, black mustard seed, ginger, orris root, laurel leaves, poppy capsules, linseed, almonds, saffron, and a monkey's skin used as a bag for the import of bitter aloes.—Geo. B. Walsh, Scarborough: *June 23rd*, 1929.

DESCRIPTION OF A NEW SPECIES OF *ACIDOTA* (COL., STAPHYLINIDAE) FROM NORWAY.

BY MALCOLM CAMERON, M.B., R.N., F.E.S.

Acidota semisericea n. sp.

From all other species of the genus except *baicalensis* Motsch., at once distinguished by the practically impunctate, strongly coriaceous, greasy-lustrous abdomen, and from *baicalensis* by its much larger size (5.5 mm.).

In general appearance nearest *A. crenata* F., but differs in the following respects : the head is broader, the antennae longer and thinner, the penultimate joints distinctly longer than broad ; the thorax is much more transverse, the sides more narrowly bordered, the puncturation a little closer, the elytra less parallel, a little widened behind, the punctures finer and irregular ; the abdomen is dilated in the middle, narrowed towards the apex, greasy-lustrous, strongly coriaceous and practically impunctate.

Head black, shining, even, subconvex, the anterior margin not elevated, rather closely punctured as in *crenata*. Antennae slender, reddish, all the joints longer than broad. Thorax black, shining, distinctly transverse, the sides narrowly bordered, reddish, evenly rounded and equally retracted in front and behind, before the rounded posterior angles with a very shallow emargination, rather closely and moderately coarsely punctured. Elytra dark brown, obscurely rufescent at the posterior margin, twice as long as the thorax, widened behind, irregularly, moderately coarsely, and rather closely punctured. Abdomen widest at the middle, from thence narrowed to the apex, black, greasy-lustrous, strongly coriaceous, practically impunctate. Legs red.

NORWAY : Trondjhem. Type in my collection.

15 Teesdale Road, Leytonstone, London, E.11.

June 18th, 1929.

SOME RECORDS OF COLLEMBOLA FROM SOUTHERN RHODESIA.

BY H. WOMERSLEY, A.L.S., F.E.S.

The species of Collembola described and recorded in this paper were collected in the neighbourhood of Salisbury, Southern Rhodesia, by Mr. Alex. Cuthbertson, of the Department of Agriculture, and have been forwarded to me from time to time for study and determination.

In all there are seven species, of which four are new to science.

The most interesting, perhaps, is *Cyphoderus cuthbertsoni* sp. n. As a rule the members of this genus are inhabitants of the nests of ants or termites, *e.g.*, our British and European *C. albinus* is to be found in almost any ant's nest. This new species, however, appears to be of some economic importance, owing to its being at least a secondary infection of stored (buried) potatoes.

The types of the following species that are new will be deposited

in the Natural History Museum, while co-types will be retained in my collection, and duplicates returned to the Division of Entomology, Department of Agriculture, Salisbury, S. Rhodesia.

To my friend, Mr. Cuthbertson, I tender my sincere thanks for the opportunity of examining these specimens.

SUBORDER—ARTHROPLEONA C.B.
FAMILY—Hypogastruridae C.B.
SUBFAM.—Hypogastrurinae C.B.
GENUS—*Hypogastrura* Bourl. C.B.

Hypogastrura manubrialis Tullbg.

Coll. No. 1554. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, III /27. A. Cuthbertson.

Two specimens of this European species were present amongst a large number of the species of *Xenylla* described later, and taken on the surface of pools. Quite probably this is an introduced species.

Hypogastrura myrmecophila sp. n. (Figs. 4-9).

Coll. No. 2,349. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia. III/29. A. Cuthbertson.

Examples of this species were contained in two tubes, both bearing the same label and each containing an ant, *Pheidole* sp.? in whose nests the Collembola were taken. As both ants were workers, Mr. Donisthorpe was unable to determine the species.

Length 1230 μ. Colour dark brown, lighter beneath and on legs and furca. Antennae as long as head diagonal, joints relatively 6 : 5 : 7 : 8; apical joint with a subapical knob and a number of almost rectangularly bent olfactory hairs, sensory organ of third joint as in fig. 5. Eyes 8+8 on black patches, postantennal organ with four lobes as in fig. 4. Legs with a single strongly clavate tenent hair, unguis strong with only a very faint tooth at the middle on the inside, unguiculus reaching to one-third of the unguis and with a narrow lamella half its length. Anal spines two, very small, placed distinctively dorsally on the prominent upper lobe of the sixth abdominal segment, each spine about one-eighth to one-seventh the length of hind unguis on short adjacent papillae (Fig. 9). Furca well developed (Fig. 8); manubrium : dens : mucro = 1 : 1½ : ⅜; mucro three-quarters length of hind unguis, long and narrow with slightly upturned apex and long narrow inner lamella ending abruptly just before the tip. Clothing fairly short and sparse, setae simple.

Genus—*Xenylla* Tullbg.

Xenylla rhodesiensis sp. n. (Figs. 1-3).

Coll. No. 1,554. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, III/27, on surface of pools. A. Cuthbertson.

From the numbers sent, this species must have occurred in a very

large quantity, as not uncommonly happens with the Collembola. It appears to be different from any member of this genus previously described, but is closely allied to *X. humicola* (O.F.) Tullbg., differing in its small size and almost obsolete anal horns.

Length 650 μ. Colour uniformly bluish-black in alcohol, but when cleared the pigment is in distinct spots placed close together. Antennae only half the length of head, joints subequal, third and fourth imperfectly differentiated, apical joint with a number of curved olfactory hairs and a subapical knob. Eyes 5+5 on a black patch, postantennal organ wanting. Legs with tenent hairs 2 : 3 : 3, only slightly clavate. Unguis with a slight inner tooth beyond the middle, unguiculus wanting. Anal spines two, extremely small on short, broad papillae, the whole not more than twice the size of the body papillae. Body hairs scanty except toward the apex. Furca relatively long, dentes and mucro well differentiated, dens : mucro = 3 : 2 ; dens with two spines, mucro with long narrow inner lamella and slightly upturned apex, three-fourths length of hind unguis.

FAMILY—Entomobryidae Töm.
SUBFAM.—Entomobryinae Schff. C.B.
TRIBE—Entomobryini C.B.
GENUS—*Pseudosira* Schött.
SUBGENUS—*Mesira* Stscherbakow.

Pseudosira (*Mesira*) *annulicornis* C.B.

Coll. No. 2,313. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, Jan., 1929, 'in breeding places for Sarcophagous Diptera.' A. Cuthbertson. 6 specs.

Coll. No. 2,349. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia. III/29. A. Cuthbertson.

Coll. No. 2,335A/B. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, III/29. A. Cuthbertson.

These specimens all appear to agree more with this species than with the form that the same author diagnosed from Madagascar, under the name of *P. voelzkowi*. It appears to be somewhat of a common species in Rhodesia, and to some extent seems to be associated with ants. The second collection contained two tubes each with a different ant (*Pheidole* sp.?). Of the first collection Mr. Cuthbertson writes me that they were frequenting soil near breeding places (decomposing ox-liver) of *Chrysomyia albiceps* (Sarcophagidae), etc., and that an ant *Pheidole crassinoda* was also common, preying upon eggs and newly-hatched larvae of the Dipteron, which they carried off to their colonies in the immediate vicinity.

Tribe—Cyphoderini C.B.

Genus—*Cyphoderus* Nic.

Cyphoderus cuthbertsoni sp. n. (Fig. 12-13).

Coll. No. 2,302. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, 'in rotten potatoes associated with nematodes (*Heterodera*).' J. K. Chorley.

The members of this genus are usually myrmecophilous or termitophilous. The peculiar habit, therefore, of this new species is of much interest as well as being of importance from the economic standpoint. The potatoes had been buried for storage purposes for several months, and on examination those that were decayed were found to be infected with nematodes and this species of 'springtail.' While probably the worms were the primary infection, further observations are needed, and Mr. Cuthbertson hopes to be able to follow up this question.

Length 1250 μ. Of general *Cyphoderus* aspect, entirely white. Antennae about twice as long as head diagonal, joints relatively 1.75 : 4 : 2.5 : 5.2; covered with fine short hairs. Eyes and postantennal organ wanting. Legs with a single spathulate tenent hair, claws similar on all feet, unguis with a strong basal tooth and two fine teeth on the inner edge slightly beyond the middle, unguiculus broad and sharply pointed with a prominent outer tooth. Body normally scaled, segments of abdomen III : IV = 0.7 : 1.6. Furca moderately long, reaching to middle of second abdominal sternite, manubrium : dens : mucro = 1.2 : 0.8 : 0.4; dens with two rows of from 7 to 9 long ribbed scales, distal outer scale almost reaching tip of mucro, the inner one slightly less, mucro quadridentate with an apical curved tooth, one subapical, another about one-third from apex and a fourth slightly less than half-way from the last to the base of mucro. Rami with four barbs, tenaculum with a strong curved spine.

Cyphoderus limboxiphius C.B.

Coll. No. 2,349. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, III/29. A. Cuthbertson.

Several specimens referable to this species were found in the nests of both the species of ant (*Pheidole*) already mentioned. Borner's specimens, however, were taken in the nests of *Termes trinervis* in Natal.

Cyphoderus africanus sp. n. (Figs. 10-11).

Coll. No. 2,349. Dept. Agric., Div. Entom., Salisbury, S. Rhodesia, III/29. A. Cuthbertson.

A single specimen, very different from any species so far described, was from the nest of one of the species of *Pheidole*. In the form of the mucro it comes close to the *similis* Imms group, but is at once distinguished by the extraordinary long outer distal scale of the dentes.

Length 1280 μ. Colour white. Antennae half as long again as the head diagonal, relative lengths of joints 1½ : 2⅔ : 2 : 4½ ; covered with fine short hairs. Eyes and postantennal organs wanting. Legs with a single spathulate tenent hair, unguis with a large inner basal tooth two-thirds of its length and two very fine teeth on the inner ege beyond the middle, unguiculus sharply pointed with a strong outer tooth. Body normally scaled. Furca relatively short, antennae : furca = 10½ : 9, manubrium : dens : mucro = 4½ : 4 : 4/5, the outer distal scale of dentes four times as long as the mucro, inner scale one-fifth longer than mucro, mucro with an apical curved tooth and a subapical tooth, apparently without inner lamella.

EXPLANATION OF FIGURES.

Xenylla rhodesiensis sp. n. Fig. 1, tibiotarsus;
" " " " 2, furca from below;
" " " " 3, one of the anal horns.

Hypogastrura myrmecophila sp. n. Fig. 4, eye patch and postantennal organ;
,, ,, ,, ,, 5, terminal joints of antennae;
,, ,, ,, ,, 6, rami;
,, ,, ,, ,, 7, foot;
,, ,, ,, ,, 8, furca from the side;
,, ,, ,, ,, 9, tip of abdomen and anal horns.
Cyphoderus africanus sp. n. Fig. 10, tip of dens and mucro;
,, ,, ,, ,, 11, third foot.
Cyphoderus cuthbertsoni sp. n. Fig. 12, tip of dens and mucro:
,, ,, ,, ,, 13, third foot.

Literature.

Borner, C. (1906). 'Collembola aus Ostafrika, Madagaskar und Sudamerika,' ex Reise in Ostafrika in 1903-5 von Prof. Dr. A. Voeltzkow. Wiss Ergeb., Bd. II. Stuttgart.

——— (1908). 'Collembola aus Sudafrika,' in L. Schultz Zool u. anthrop. Ergebnisse e Forschungereise in Sudafrika. Bd. I, lfg. I, Denskschr. med. Ges. Jena.

——— (1913). 'Neue Cyphoderinen,' Zool. Anzeig., XLI, pp. 274-284.

——— ——. 'Zur Collembolenfauna Javas, etc.,' Tijdschr. voor Entom., lvi, pp. 44-61.

Brook, G. (1884). 'Notes on some little-known Collembola, etc.,' Jour. Linnean Soc., Zool.

Brown, J. M. (1920). 'A new Termitophilous Collembolan from West Africa,' Ann. Mag. Nat. Hist., ser. 9, vi, pp. 480-482.

——— (1921). 'The swarming of Collembola,' Naturalist, London, pp. 129-130.

——— (1926). 'On some African Apterygota,' Ann. & Mag. Nat. Hist., Ser. 9, Vol. XVIII, p. 34.

——— (1926). 'On some Collembola from Mesopotamia,' Jour. Linnean Soc., Zool.

Caroli, E. (1914). 'Primi Collemboli raccolti nella Libia italiana,' Annuario del Museo Zool., Napoli.

Carpenter, G. H. (1912). 'A new West African Springtail,' Bull. Entom. Research, Vol. 3, Pt. 1, p. 79.

——— (1916). 'Apterygota of the Seychelles,' Proc. Roy. Irish Acad., XXXIII, Bd. 1, pp. 1-70.

——— (1917). 'Collembola, Zool. Results of the Abor Exped., 1911-1912,' Rec. Ind. Mus., Calcutta, viii, pp. 561-568.

(1919). 'Two new species of Collembola from Nyassaland,' Proc. Royal Dublin Soc., pp. 543-5.

Denis, J. R. (1924). 'Sur la faune francaise des Apterygotes (IVe Note),' Arch. Zool. Exp. et Gen., Tome 62, fasc. 3.

——— ——. 'Sur la faune francaise des Apterygotes (Ve Note),' Bull. Soc. Entom. de France, Nov., No. 18

——— (1924-5). 'Sur les Collemboles du Museum du Paris,' Ann. Soc. Ent. de France, Vol. XCIII et XCIV.

——— (1925). 'Sur la faune francaise des Apterygotes (VIIe Note),' Bull. Ent. Soc. de France, May, No9.

——— ——. 'Sur la faune francaise des Apterygotes (VIIIe Note),' Bull. Ent. Soc. de France, Oct., No15.

——— (1927). 'La Faune Italienne des Apterygotes,' Ann. des Sci. Natur., Tome X, fasc. 2.

Folsom, J. W. (1916). 'North American Collembolan Insects of the subfamily Achorutinae, etc.,' Proc. U.S. Nat. Mus., Washington, I, pp. 477-525.

——— (1917). 'North American Collembolan Insects of the subfamily Onychiurinae,' Proc. U.S. Nat. Mus., Washington, liii, pp. 637-659.

——— (1923). 'Termitophilous Apterygota,' Zoologica, Vol. iii, No. 8.

——— (1924). 'East Indian Collembola,' Bull. Mus. Comp. Zool., Harvard, Vol. lxv, No14.

(1927). 'Insects of the Subclass Apterygota from Central America and the West Indies,' Proc. U.S. Nat. Mus., Washington, Vol. 72, pp. 1-16.

Handschin, E. (1924). 'Collembolenfauna des Schweizerischen Nationalparkes,' Mem. Soc. Helv. d. Sci. Natur., Bd. lx, Abh. 2.

——— (1926). 'Collembola from the Philippines and New Caledonia,' Philippine Jour. Sci., Vol. 30, No2.

——— ——— 'Collembolen aus Algerian,' Zeit. f. wiss. Insektenbiol., Bd. III, No. 13/14, pp. 117-126.

——— (1927). 'Collembolen aus Costa Rica,' Entom. Mitteil., Bd. XVII, No. 2.

——— (1928). 'Collembola from Mexico,' Jour. Linnean Soc., Zool., Vol. XXXVI.

Imms, A. D. (1912). 'On some Collembola from India, Burma, Ceylon, etc.' Proc. Zool. Soc. Lond., pp. 80-125.

Linnaniemi, W. M. (1912). 'Die Apterygotenfauna Finlands,' Acta Soc. Sci. Fenn., xl, 5, pp. 1-361.

Schaffer, C. (1898). 'Die Collembola des Bismarck-Archipels,' Arch. f. Nat., i, 3, pp. 393-425.

Schott, H. (1893). 'Zur Systematik und Verbreit. Palaearktischer Collembola,' Upsala.

——— (1917). 'Results of Dr. E. Mjoberg's Swedish Scientific Exped. to Australia, 1910-1913. 15. Collembola,' Arkiv. f. Zool., Stockholm, xi, No. 8.

Shoebotham, J. W. (1917). 'Notes on Collembola. Pt. 4,' Ann. Mag. Nat. Hist., ser. 8, xix, pp. 425-436.

Tullberg, T. F. H. (1872). 'Sveriges Podurider,' Kongl. Vet.-Akad. Handl., X, No. 10, Stockholm, pp. 1-70.

Wahlgren, E. (1900). 'Collembola auf Jan Mayen u. Ost Gronland.'

Sunny Meads, West Town, Somerset.
June 17th, 1929.

Trox scaber L. at Rostrevor.—On May 3rd my friend Mr. R. G. Atkinson brought me a small Lamellicorn beetle which he had caught crawling on the window of his room. I recognised it as a *Trox*, but was in doubt as to whether it was *T. scaber* or *T. sabulosus*, having no personal acquaintance with either species; so I sent it to my kind friend Commander J. J. Walker, who informs me that it is the former insect.

T. scaber L. has not hitherto been taken in the North of Ireland; in fact, there are but two Irish records of its occurrence, *viz.* in Mr. Furlong's list, which is pretty old, and by Mr. J. N. Hulbert in the 'Irish Naturalist' ix, 1900, p. 282, from Dundrum, Co. Dublin.—W. F. Johnson, Rostrevor, Co. Down: *May 31st*, 1929.

Brachypterolus pulicarius damaging Linaria purpurea.—Mr. Fryer's interesting paper on the occurrence of the Nitidulid beetle *Brachypterolus vestitus* in Britain, and the injury done by it to *Antirrhinum* (Ent. Mo. Mag., May 1929, p. 101), has reminded me of some unpublished notes on the congeneric species *Brachypterolus pulicarius* L. (*Brachypterus gravidus* Ill., *B. linariae* Steph.). At intervals over a number of years I have found the purple toadflax, *Linaria purpurea*, heavily infested and damaged by this beetle. *Linaria purpurea*, a South European species, runs almost wild in some English gardens if allowed to do so, sowing itself in borders, gravel paths or old walls. It is biennial, or sometimes the plants live three or more years. They are tall, with narrow glaucous-grey leaves and small purple flowers. Normally the terminal racemes flower freely about midsummer, and lateral racemes lower down the stems keep up the flowering till late summer or early autumn. The damage by the beetle consists in the tender growing points of the leading racemes being eaten off in early summer, so that their flowers never bloom; this makes the lateral racemes grow excessively long, so that, although their flowers come to perfection in late summer, the plant has the stunted, ungraceful appearance known as 'bushy top.'

The incidence of the infestation is (in my experience) irregular. I saw this toadflax flower in an old garden at Henley-on-Thames every season from 1900 to 1916 inclusive, but remember no occurrence of the damage there. Some young plants taken to a new garden at Cambridge in 1913 flowered undamaged in 1914, but in 1915, when they had increased considerably by seeding, nearly all were severely infested. This was the first year in which I observed the damage, which was repeated in 1916, but less markedly, some plants almost entirely escaping. In 1917 it was hardly noticeable, the plants had increased greatly and many seemed untouched. No further instance was observed till 1926, when eight or nine plants exhibited the characteristic 'bushy top' and a large number of the beetles was shaken from them on May 31st. Plenty could always be shaken from the infested plants in early and mid-summer, and in the earlier years I repeatedly found a beetle sitting in the centre of the truncated, injured top of a main stem, the growing point of which had been eaten away. In 1915-1917 no specimens were kept, but Mr. Fryer has confirmed my identification of the beetles collected in May, 1926.

This beetle is known to eat parts of the flowers of our native *Linaria vulgaris*, and probably other native species of *Linaria*, but I have never remarked similar damage to these plants. In attacking *L. purpurea* in England, the insect is showing a taste for an introduced species of its host-genus, wild specimens of which it may attack with similar results in Southern Europe, but on this last point I have no information. The purple toadflax was not grown in other gardens quite close to mine, and the *Brachypterolus* may therefore have been attracted from some distance round.

The life-history of *Brachypterolus pulicarius* has been dealt with by several writers: *e.g.* Cornelius, Stettin. Ent. Zeit. xxiv, 1863, p. 113 (cited by de Marseul, l'Abeille iv, 1867, p. 134); Kaltenbach, Pflanzenfeinde 1874, p. 466; Perris, l'Abeille vii, 1870, p. 36, and Larves de Coléoptères 1877 (separate edition), p. 35. According to them, the adult beetles oviposit in early summer between the terminal leaves and flower-buds of the main stems, and the larvae eat the pollen, stamens, etc., of the undeveloped flowers and later bore into the young capsules. They pupate in the soil, and the adults emerge about mid-September after a pupal stage of four weeks. Presumably the actual damage to the growing-points, resulting in 'bushy-top,' is caused, not by the larvae, but by the adult beetles, which frequent the plants in early summer to lay their eggs, but disappear before the lateral flower-racemes develop, so that these escape injury.—Hugh Scott, Charlbury, Oxon: *June 22nd*, 1929.

The Hatching of Calocoris norvegicus Gmel.—The oviposition of *Calocoris norvegicus* Gmel. (*bipunctatus* Fabr.) in fence posts during August was reported by us in the E.M.M. for September, 1928. The egg was later described and figured *in situ* (E.M.M. LXV, Plate II).

On June 2nd, 1929, some of the eggs laid in these posts were found to be hatching and many first instar nymphs were seen running about on the fence, and could also be beaten from the mixed herbage (mostly nettles and grass) growing below. It was found possible to watch the whole of the hatching process; this was best accomplished by cutting off portions of the fence posts and examining them in the laboratory under a binocular microscope. Photomicrographs were taken at various stages, and will be published elsewhere.

The first sign of hatching is the appearance of the cap or operculum at the surface of the wood. When the egg is laid the cap is buried about ·2 mm below the surface of the wood and cannot be seen. It is apparently prised off from the 'neck' of the egg by means of an oviruptor, which is discarded with the embryonic skin during eclosion.

The cap falls to one side and the insect gradually emerges from the egg, without any apparent exertion until about half-way out. Then a slow backward and forward 'straining' action occurs, and what appear to be air bubbles pass backwards from the pharyngeal region in rapid succession. The egg and the emerging insect now form almost a semicircle, the arched dorsum corresponding to the convex side of the egg.

The front legs are the first appendages to be withdrawn, and are followed in rapid succession by the meso- and meta-thoracic legs. The antennae, being very long, are withdrawn last.. After the appendages are free the insect falls forward and obtains a foothold with which to pull the rest of its abdomen out of the egg.

The time taken in hatching seems to vary—one or two individuals took just over half an hour for the entire process.—A. M. MASSEE and W. STEER, East Malling Research Station, Kent: *June 6th*, 1929.

Brachypalpus bimaculatus Mcq. in Epping Forest.—On the hot and sunny morning of Whitsunday, June 6th, 1922, while resting in the shade of a large oak in Epping Forest, I became aware of a persistent bumming noise, which on investigation I found proceeded from a Syrphid fly, which was hovering round, and occasionally settling on, the trunk. On capture and subsequent examination at home, and suspecting its identity, I went again to Epping Forest a week later, and took another specimen in the same manner, this latter being in very fresh condition, while that first taken was very worn.

Brachypalpus is stated by Mr. Verrall in 'British Flies,' Vol. V, to be 'uncommon in England, but several specimens have been taken in recent years in the New Forest, usually, I believe, sitting near the ground on the stems of trees.' He gives us further localities: Bickleigh Vale (Devon), Sherwood Forest, Ledbury and Sutton Park (Birmingham), and mentions that his dates extend only from May 18th to June 11th. The species is represented in the fine collection of British Diptera in the Natural History Museum by five examples; four of these are New Forest captures of old date by the late Col. Yerbury, and the only recent example is one labelled 'Wisley, Surrey, 28th April, 1921—on apple flower, G. Fox Wilson,' this date being about three weeks in advance of the earliest given by Verrall. I have only been able to find two records of *Brachypalpus* in the considerable period which has now elapsed since the appearance of Mr. Verrall's book. The first was that of Mr. Colbran J. Wainwright in this Magazine for August, 1901 (Vol. XII, 2nd series, p. 198), of a specimen taken

by himself near West Malvern at Whitsuntide, 1901; he there remarks that 'the species is only recorded by Mr. Verrall in his recent work from five localities, and I believe only one or two specimens have been found in each place, so that it remains a very rare species at present,' adding that the Ledbury locality given by Verrall was practically in the same district as that of his own capture. The other record was by Mr. F. C. Adams, in Ent. Mo. Mag., 2nd series, Vol. XV, p. 110 (1904), of a specimen taken at flowers of Portugal laurel in the New Forest at about the end of June, 1903, a further extension of Mr. Verrall's dates.

My capture would therefore appear to be of some interest, and as I have paid many visits to the spot at the right time since 1922 without result I think it as well now to record them. On the occasion of my visit this year, on May 23rd (a fine hot day), nothing of greater interest than *Syrphus bifasciatus* F. was to be seen in the vicinity of the old oak or its neighbours.—F. B. Jennings, 152 Silver Street, Upper Edmonton, N.: *June*, 1929.

Reviews.

BLIND INSTINCT OR CONSCIOUS ACTION?

The Origin of Instinct: A Study of the War between the Ants and the Termites. By Professor E. Bugnion. Translated by C. K. Ogden. Psyche Monographs, No. 1. Kegan Paul, Trench, Trubner & Co., 1927 (actually appeared Jan. 1928), pp. 1-44, pl. i-viii. Price 5/-.

Le Communisme chez les Insectes. By Professor E. L. Bouvier. Bibliothèque de Philosophie Scientifique, ed. by E. Flammarion, Paris, 1926, pp. 1-291, text-figs.

The first of these works was originally written as an Appendix to Part IV of Forel's 'The Social World of the Ants,' which was to be published in England and America simultaneously with this monograph. Its *raison d'être* as a separate book lies as much in the domain of psychology as of entomology. The author thinks that practically all the highly specialised means of defence possessed by termites have been developed as a result of the age-long warfare of these insects with their aggressors, the ants—a struggle which may have endured since middle Tertiary times at least—and that the evolution of these powers throws light on the genesis of instinct. Human reason and animal instinct have long been regarded as possessing nothing in common, but to-day naturalist-psychologists recognise that the origin of instincts was 'lighted by a ray of intelligence,' and that these reasoned and conscious actions, many times repeated, have become almost automatic habits. This necessitates the admission that actions useful for the conservation of the species leave a durable impression on the brain and become hereditary. In opposition to Weismann, who refused to admit inheritance of acquired characters, Bugnion unhesitatingly maintains 'that the hereditary transmission of newly-acquired instincts is a proven . . . fact.'

After narrating various observations and experiments relating to the ant-termite war, beginning from the highest-developed termites and passing to the more primitive genera, the author reverses his order and, commencing with the most lowly, seeks to reason out how the special powers of defence of each group can have been evolved. He distinguishes three categories of instincts: those (A) connected with defensive measures borrowed from Nature, (B) connected with anatomical structure, (C) resulting from mental dispositions which have become

automatic. One instance must suffice: under category (A), the case of a primitive wood-boring termite which, when threatened, faces the enemy at the entrance of its burrow but, finding this sentry duty irksome, adopts the plan of blocking the entry with a pellet of compressed wood-dust, instead of casting this out of the gallery as waste. In such an action might lie the germ of all those processes of entrance-blocking and breach-repairing which we see to-day. Although the workers and soldiers are not normally fertile, yet two ways are suggested (pp. 40, 41) in which new instincts acquired by them could be transmitted to later generations.*

Whereas human societies manifest the greatest diversity, exhibiting every grade of intelligence and moral fibre, termite societies present the most complete uniformity. In every caste there is 'universal levelling, that dream of communists throughout the ages.' In the second work cited (which, though published in 1926, seems to have found its way into scarcely any British libraries) the learned author tries to analyse what it is that animates the societies not only of termites but of all social insects, what guides and co-ordinates activities seemingly performed independently and without apparent direction. The first five chapters deal with the nature of insect societies, and the next four with their genesis and evolution. In the last six is discussed their 'mechanism' under such headings as 'primordial rôle played by instincts,' 'intelligence in isolated social insects,' their individual behaviour, the relations of individuals one with another within the society, 'plastic individual activity in the social *milieu*' and (lastly) a comparison between insect societies and human society. The author explains that his title was not chosen on account of the present prominence of communism in human politics, but that he used the term ten years or more ago because the communism of these insect societies is total and perfect, and no other term fits the case. His conclusions, very briefly stated, are that insect societies, like human society, obey exclusively a directing power represented by two great psychic forces, one instinctive, to which each individual responds blindly, the other plastic and more or less intelligent: but since he infers that the blind instinctive force originated through a process of fixation of habits, which have become automatic by inheritance through many generations, his view is essentially in agreement with Bugnion's view. Moreover, while in insect societies the instinctive force is dominant and leaves little room for intelligent initiative, in human society the proportions of the two forces are exactly reversed. His book must appeal to a very wide circle of entomologists and other readers.—H.S.

Society

ENTOMOLOGICAL SOCIETY OF LONDON: *Wednesday, June 5th,* 1929.—Dr. K. JORDAN, President, in the Chair.

Ernest Frederick Burdett, 70 Hamilton Crescent, Eastcote Lane, South Harrow, Middlesex, was elected a Fellow of the Society.

The President exhibited a number of Anthribid beetles to illustrate the difference in position of certain male characters in some allied genera of this family. Mr. G. Talbot exhibited and made remarks upon a number of new mimetic forms of Lepidoptera. Mr. N. D. Riley read part of a letter from Col. H. D. Peile

* Some trivial printers' errors may be passed over, but on p. 28, line 12, there is apparently a mistake in stating the length of a marching column of ants. On pp. 17 and 42 the term 'cocoa trees' is used, an ancient source of confusion, since we are left in doubt whether *Cocos nucifera*, the coconut palm, or the completely unrelated *Theobroma cacao* the cacao-tree (origin of 'the 'cocoa' of commerce) is meant.

discussing reversed colouring in *Fidonia plumistaria*. Mr. H. M. Edlesten exhibited living larvae of *Chrysophanus dispar batavus* from the colony at Wood Walton Fen and presented the report of the Society for the Protection of British Lepidoptera on the reintroduction of this butterfly into Britain. Dr. P. A. Buxton showed numerous lantern slides to illustrate the haunts of Samoan insects.

The following papers were read: (1) 'Notes on *Ampagia* (Curculionidae), with descriptions of new species,' by Mr. A. M. Lea. (2) 'Hymenoptera of the "St. George" Expedition collected in Central America and the West Indies,' by Miss L. E. Cheesman. (3) 'Odonata of Matto Grosso, Brazil,' by Miss C. Longfield. (4) 'A Revision of the Indo-Australian and Ethiopian species of the genus *Microgaster* (Hym. Braconidae),' by Capt. D. S. Wilkinson. (5) 'Pacific Pyrales of the "St. George" Expedition," by Mr. E. Meyrick. (6) 'On a group of minute Australian Thysanoptera (Tubulifera), and their association with the so-called Leaf-glands on *Acacia*,' by Mr. R. S. Bagnall. (7) 'Spiral and other anomalies of segmentation,' by Dr. E. A. Cockayne. (8) 'Morphogenesis in the Muscoid Diptera,' by Dr. W. R. Thompson. (9) 'Some Ceratopogoninae from the Transvaal,' by Mr. B. de Meillon.—S. A. Neave, *Hon. Sec.*

NOTES ON SOME SPECIES OF *LITHOCOLLETIS*, WITH AN ADDITION TO THE BRITISH LIST.

BY E. G. R. WATERS, M.A., F.E.S.

The days of enthusiasm when Stainton and his fellow entomologists 'bred *Lithocolletides* till they were tired,'[1] or when Mr. E. R. Bankes, by breeding *Lithocolletides* in hundreds from fruit-trees, solved the mystery of *concomitella* and its allies,[2] are now long past; and the genus *Lithocolletis*, in common with most other small Micro-lepidoptera, seems to be almost entirely neglected by British entomologists of the present day. This neglect is undeserved, for, apart from the extreme beauty of many of the species, the *Lithocolletides* present interesting problems of various kinds. Their distribution even in this country is imperfectly known, and undetected species certainly await discovery. The habits of many of them require elucidation; who will discover the larva of *ulicicolella*, or prove that *comparella* hibernates in the imaginal stage, or show what happens to the winter brood of *messaniella* where it feeds on deciduous trees, or explain why larvae of *nigrescentella* are to be found feeding in April as well as in the autumn? Above all, the variation of many species in this genus is full of interest; we find much instability in the wing markings (which are often unsymmetrical even in a single individual), convergent variation in different species, seasonal and local variation, and variation

[1] Natural History of the Tineina, I, 1855, p. 30.

[2] See Ent. Mo. Mag., xxxv, 1899, pp. 241 ff.

depending on the food-plant. Several groups of species are extremely similar, and have evidently acquired their specific characteristics in quite recent times; while several existing forms, though not yet specifically distinct, must be regarded as species in the making. In the following notes I do not pretend to solve problems, but merely to put on record my observations on some of the less-known species.

Lithocolletis anderidae Fletcher. This pretty species enjoys the distinction of being, on an average, the smallest of the British *Lithocolletides*, having a wing-expanse of from 4 to 6 mm. only. Very little has been heard of it since it was discovered in Abbot's Wood, Sussex, by Mr. W. H. B. Fletcher,[3] and detected at Bloxworth, Dorset, by the Rev. O. Pickard-Cambridge and Mr. N. M. Richardson.[4] The only additional locality recorded since 1890 seems to be Tilgate Forest, in Sussex.[5] The sight of a short series from Bloxworth in the collection of Prof. A. W. Pickard-Cambridge gave me a clear idea of the species, and induced me to hunt for it—with immediate and unexpected success. Some *Lithocolletis* mines collected from birch (*Betula alba* and *B. pubescens* indiscriminately) on July 29th, 1928, in various spots on Ockley Common, a boggy heath in south-west Surrey, produced four examples of *anderidae* between August 6th and 9th, along with a much larger number of *L. ulmifoliella* Hübn. Returning to the same locality on October 6th, 1928, I searched for more mines, but for a long time without success; until, just as dusk was falling, in a shallow boggy depression somewhat sheltered by trees and a bank, I came across some minute bushes of *Betula pubescens*, mostly not above six inches high and hidden in heather, on which small *Lithocolletis* mines were plentiful, some bushes having every leaf distorted by one or more larvae. In a few minutes, with my wife's aid, I collected several score, strongly suspecting on account of the small size of the mines that they must be *anderidae*. When brought indoors in January, the pupae responded readily to warmth, and some forty moths emerged between February 2nd and March 1st, all without exception being *anderidae*. Several new facts are thus established. A Surrey locality can be added to those already known. As stated in Meyrick's Handbook (on what authority?), there is a brood of larvae in July and of imagines in August. The food-plant is the downy-leaved birch, *Betula pubes-*

[3] See Ent. Mo. Mag., XXII, 1885, p. 40.

[4] Ibid., XXVI, 1890, pp. 192 and 243; LIII, p. 114.

[5] The Victoria History of the Counties of England: Sussex, I [1906], p. 208; probably on the authority of Mr. Fletcher himself.

cens;[6] mines collected in the same locality on *Betula alba* have produced *L. ulmifoliella* only. Whether the Sussex and Dorset specimens were bred from *Betula alba* or *B. pubescens* has never been explicitly stated; the published records say merely 'birch,' which is interpreted in Staudinger and Wocke's 'Catalog'[7] as *Betula alba,* though *B. pubescens* is equally possible. My experience shows that *anderidae* is not necessarily so scarce as is supposed. In all probability it would be found, if systematically searched for, on other boggy heaths in the South of England, and perhaps in other parts of the country.

In at least one respect the accepted description of *anderidae* requires revision. The central white fascia, which was described by Fletcher as 'angulated on the side nearest the base, but less so on the outer side,' is very irregular in form, and sometimes differs even in the forewings of a single individual. It is occasionally quite straight, more often obtusely angulated, sometimes sharply angulated in the middle, and frequently rounded (inwardly convex); while in a few of my specimens it is divided by an arm of the golden ground-colour into two opposite spots, the white markings then consisting of four costal and three dorsal tooth-shaped spots.

It should be added that *anderidae* can no longer be regarded as an exclusively British product, Herr W. Petersen having obtained the species on a moor near Nömme, Esthonia. With great kindness, he has sent me three handsome examples of the moth, as well as some mines. In his account of this discovery, which is accompanied by a description of his specimens and figures of the genitalia,[8] he notes as striking characteristics of *anderidae* its small size and the variability of its markings. The Esthonian *anderidae* are, nevertheless, larger than my own examples, ranging from 4.5 to 6.5 mm. in expanse, and exceptionally attaining 7 mm.; in other respects they agree perfectly with British *anderidae.* At Nömme the larvae are found only on *Betula nana* and on hybrids between that species and *B. pubescens.* Herr Petersen has therefore made (in a letter to me) the interesting suggestions that *anderidae* in the south of England is a relic of the glacial age, that its normal food-plant is *Betula nana,* and that it transferred itself to another species of birch (hybrids probably serving as intermediaries) when *B. nana* became extinct there. The fact that

[6] Treated in the older botanical books as a variety or a sub-species of *Betula alba*; now usually regarded as a species. Micro-lepidoptera attached to birch frequently show a decided and even exclusive preference for one species or the other.

[7] 1901 edition, part II, no. 4126.

[8] Stettiner Entomologische Zeitung, LXXXVIII, 1927, pp. 136 ff.; see also p. 122.

the present food-plant is *B. pubescens*, which is much closer than *B. alba* to *B. nana*, lends plausibility to this conjecture. *Anderidae* may be expected to occur in other parts of Northern Europe; and in particular it should be looked for in Scotland or the North of England on *B. nana.*

L. cavella Zell. Meyrick's 'Handbook' mentions only Kent, Essex and Hereford as localities for this species. It is, however, much more widely distributed, and would probably be found in most parts of the south of England, if looked for. It has been recorded on reliable authority from various places in Sussex[9] and Surrey,[10] and I have myself bred examples this year from Hindhead in south-west Surrey. The moth has also been obtained in Dorset (a series from Bloxworth in the collection of Prof. A. W. Pickard-Cambridge) and Hants (Poundhill Enclosure in the New Forest).[11] In Berkshire I have captured *cavella* near Wellington College in the south-east (1926 and 1929), and bred examples from Tubney Wood in the north of the county (1924 and 1929). Its large mines seem to occur only on *Betula alba* (not *B. pubescens*). Brightly coloured examples of *L. spinolella* Dup. with the central fascia angulated sometimes come close in general appearance to *cavella*;[12] but they may always be distinguished by the form of the white basal streak. In *spinolella* the streak is shorter (seldom over ⅓) and broader, and widens evenly towards its apex, where it is abruptly truncated; in *cavella* the streak is longer (often reaching ⅖) and narrower, and after widening beneath just before the apex, has its upper edge prolonged into a point, the general shape being that of a cricket-bat viewed sideways.

L. geniculella Rag. My expectation that this insect, which is common in the Oxford district, would be found elsewhere in Britain[13] has already been fulfilled. On October 8th, 1928, I found its mines commonly on sycamore (*Acer Pseudo-platanus*) on Mickleham Downs in Surrey—formerly the happy hunting-ground of Stainton and his friends, who would surely have noticed so conspicuous a *Lithocolletis*, had it occurred there in their day. Unfortunately I did not take proper care of the few leaves that were collected, and only two imagines were bred from them; but these are both particularly interesting specimens. One is an

[9] Victoria History: Sussex, I [1906], p. 208.

[10] Ibid, Surrey, I [1902], p. 149.

[11] See Entomologist, L, 1917, p. 15.

[12] Cf. Ent. Mo Mag., LXI, 1925, p. 192; but one of the specimens there alluded to was an actual example of *cavella*, bred probably from a birch-leaf which by some oversight had been placed among sallow leaves. Herr W. Petersen was good enough to verify this by examining the genitalia.

[13] See Ent. Mo. Mag., LXIV, 1928, p. 12.

example of the aberration *pseudoplataniella* Rag., not hitherto noticed in this country. In this form the first dorsal wedge-shaped spot, instead of forming an acute-angled fascia with the corresponding costal spot, is reduced to a dark spot on the dorsum, being separated from the costal spot by an interval of the ground-colour. Originally described as a species,[14] it is now generally regarded, in spite of its distinct appearance, as a form of *geniculella.*[15] Sorhagen mentioned that he had seen specimens in which one wing had the markings of *geniculella,* the other of *pseudoplataniella*; and in this connection it is worth pointing out that in my specimen the separation of the costal and dorsal spots is much less complete on one side than on the other. Evidently *pseudoplataniella* is an aberration, not a local or seasonal form, of *geniculella.* The second of my Mickleham specimens is an aberration of a different type. Its first fascia is angulated, but does not end in a fine point, and there is no dark line extending from the angle to connect it with the second fascia. This form approaches certain forms of *L. sylvella* Haw., and it therefore seems desirable to point out that the most reliable distinction between *sylvella* and *geniculella* is to be found, not in the fasciae, but in the basal markings. In *sylvella* two parallel transverse dark lines near the base form the margins of a basal fascia. In *geniculella* the basal markings consist of a short line along the base of the costa, a small spot (sometimes absent) on the base of the dorsum, a short costal streak pointing towards the tornus, and an erect dorsal streak pointing to the base of the costal streak; these markings are sometimes more or less connected up, but never form two parallel lines. I would urge any entomologist who can find *Lithocolletis* mines on sycamore to assist in studying the forms of this interesting moth, by collecting the mines in July or October, and breeding series from fresh localities.

In the Annales de la Soc. Entom. de France, 1920, pp. 405 ff., J. de Joannis has unravelled with remarkable skill the tangled problem of the *Acer*-feeding *Lithocolletides.* He treats *pseudoplataniella* as Ragonot's specific name for the sycamore-feeder, with priority over *geniculella,* but displaced in its turn by Zeller's name *acernella*; at the same time he replaces Haworth's name *sylvella* by Zeller's *acerifoliella* for the maple-feeding species. I am, nevertheless, reluctant to abandon the accepted names on the

[14] In Petites Nouvelles Entomologiques, 1873, no. 86, p. 346, and Annales de la Soc. Entom. de France, 1874, p. 600; figure ibid, 1876, plate 6, no. 9.

[15] Cf. L. Sorhagen, in Illustrierte Zeitschrift für Entomologie, V, 1900, pp. 249 f.; Staudinger-Rebel, Catalog, II, no. 4112.

technical grounds urged. It was Ragonot who first clearly separated the sycamore- from the maple-feeding species, and bestowed the name *pseudoplataniella* on a particular form of the former; I venture, therefore, to continue using his names, with the connotation that he gave them.

L. junoniella Zell. This species, usually regarded as a northern insect, is common on the moorlands of the Welsh border, and may be expected to occur in any part of Wales or western England where its food-plant, *Vaccinium Vitis-idaea,* is plentiful. I have found it on the Black Mountains, both in Monmouthshire (an old mine seen near Llanthony, at an elevation of about 1,600 feet, on July 9th, 1928) and on the eastern edge of Brecknock (an imago captured and empty mines seen on Hay Bluff, at 2,200 feet, July 14th, 1926); while Dr. J. H. Wood recorded the species from the western border of Herefordshire.[16] On the fine moors of Radnor Forest, so thickly clad with heather and *Vaccinium,* it is locally common, between 1,500 and 2,000 feet up; the imago (presumably of the second brood) was flying freely there in evening sunshine on July 16th, 1926, and the mines were found in great abundance between April 20th and 23rd, 1929. Unfortunately, the fact that the larva feeds in the early months of the year, when there are few other small larvae about, seems to expose it to an unusual degree to the attention of parasites. From a large number of mines collected this spring (probably not less than 200) only seven imagines were bred, and these appeared to come chiefly from larvae that had begun feeding late and were immature when collected; the remainder, apart from a few casualties due to other causes, all produced a species of *Bracon.* The supposed preference of this moth for a shady habitat[17] certainly does not prevail in the localities just mentioned, which are bare of trees, and where *Vaccinium Vitis-idaea* grows only on the open moors.

L. salicicolella Sirc. A striking form of this species, not determinable as *salicicolella* by the usual tests,[18] deserves to be recorded. In it the golden ground-colour is more or less completely suffused with fuscous, and the markings are unusually white and clear; the first costal and dorsal spots are combined into a curved or angulated fascia; the spot near the base of the dorsum is much enlarged, and tends to coalesce with the medium basal streak. Eight imagines, which I bred in the winter of 1924-25, from leaves

[16] Victoria History: Herefordshire, I [1908,] p. 96.

[17] Cf. Stainton, Nat. Hist. Tin., II, 1857, p. 178.

[18] Cf. Stainton, Nat. Hist. Tin., II, 1857, pp. 60 and 68.

of *Salix cinerea* collected the previous August at Dolwyddelan, Caernarvonshire, were all of this form, or modifications of it. They were so remarkably uniform in size (6 to 7 mm.) and appearance, and so different from ordinary *salicicolella,* that I regarded them for some time as an undescribed species; but Herr W. Petersen, to whom I submitted specimens, has found the genitalia to be identical with those of *salicicolella.* Recently I have captured and bred (again from *Salix cinerea*) several exactly similar examples from Yarnton, Oxfordshire, along with typical *salicicolella.* Another example in my possession, bred from sallow in 1923, comes from the northern side of Cader Idris, in Merioneth. In view of its evident tendency to form a local race, I venture to name this form ab. (? var.) *fusca,* and am depositing the type specimen in the Hope Department at the Oxford University Museum. From *L. spinolella* Dup., which it resembles in having a clear white fascia, it may be distinguished by its smaller size and by the long and fine basal streak. In several respects (the fuscous ground-colour, the white fascia, and the tendency of the dorsal spot to unite with the basal streak) the new form comes remarkably close to *L. viminetorum* Staint.; from that species it may be separated, not only by the difference of food-plant (*viminetorum* being confined to *Salix viminalis*), but also by the more shining white of the markings, which stand out more sharply, and contrast more vividly with the ground-colour.

L. strigulatella Zell. Though in all probability it has been artificially introduced, this pretty insect is a welcome addition to the British list. Its occurrence has already been announced in my 'List of the Micro-lepidoptera of the Oxford District,'[19] but I take this opportunity to give more particulars. An unfamiliar tree is always (or should always be) an object of interest to the Micro-lepidopterist; consequently, I have been interested during the last year or two in some strange-looking alders, growing in a recently-felled copse at Cothill, Berks, which proved on investigation to be the continental hoary alder, *Alnus incana.*[20] In October, 1928, I found that the leaves of these bushes contained numerous *Lithocolletis* mines—small oval underside blotches, reddish-brown beneath, often several in a leaf—some of which I collected. Brought indoors at Christmas, in less than a fortnight these mines began producing imagines, which proved to be not (as I fully expected) one of the British alder-feeding species, but

[19] In the Report of the Ashmolean Natural History Society of Oxfordshire for 1928, p. 52.

[20] Dr. G. C. Druce has kindly corroborated this identification.

L. strigulatella, a species which abounds on *Alnus incana* on the Continent, but has not hitherto been noticed in this country. Between January 7th and February 5th there emerged over eighty examples, all of the same species.

Strigulatella is satisfactorily described by Frey[21] and Wocke,[22] and is figured by Spuler.[23] It varies considerably in size (expanse from 6 to 10 mm.). An average specimen rather closely resembles *L. nigrescentella* Logan, not only in size and build, but also in its reddish-golden ground-colour; while the white-tipped antennae remind one strongly of *L. lautella* Zell. *Strigulatella,* however, has no fascia, but a white basal streak and four costal and three dorsal white tooth-shaped spots; and it is readily distinguished from any closely-allied species by the first costal spot, which points towards the tornus, and is usually prolonged so that it terminates midway between the apices of the first and second dorsal spots.

It is difficult to believe that *strigulatella* can have been introduced into Britain except with the tree on which it feeds. Unfortunately I have not been able to ascertain how long the bushes in question have been there. The owner of the ground (Mr. W. T. Morland, of Abingdon), who has very kindly made inquiries on my behalf, assures me that no replanting has taken place in that spot for the last fifty years, and considers the bushes in question to be seedlings such as always spring up after a cutting of the alders. It is possible, but by no means certain, that a predecessor of his, who was interested in foreign trees, planted the foreign alder as an experiment about 1851. Possibly, therefore, *strigulatella* has been there for many years, but confined to its particular trees, and inaccessible in the dense covert. One would have expected it to stray sometimes, as it does on the Continent, on to *Alnus glutinosa*; but I have bred and captured large numbers of *Lithocolletides,* of all the four British alder-feeding species, from alders growing close by, without coming across a single *strigulatella.*

184 Woodstock Road, Oxford.
June 25th, 1929.

[21] Die Tineen und Pterophoren der Schweiz, Zürich, 1856, p. 332.

[22] Heinemann und Wocke, Die Schmetterlinge Deutschlands und der Schweiz, III, 2, 1876 p. 684.

[23] A. Spuler, Die Schmetterlinge Europas, II, Stuttgart, 1910, plate 90, fig. 32.

TROX PERLATUS GOEZE IN DORSET: AN ADDITION TO THE BRITISH COLEOPTEROUS FAUNA.

BY P. HARWOOD, F.E.S.

When exploring the cliffs between Swanage and Lulworth Cove, Dorset, on March last, I found the above-mentioned beetle in small numbers in the skins of two very young lambs, which, judging by the odour around them, had been the victims of a fox.

The insects were in a very dirty condition and more or less covered with clay, and I distributed all but one of the specimens under the impression that they were *T. sabulosus.* I am much indebted to my friends Messrs. J. H. Keys for suggesting, and K. G. Blair for confirming, their true identity.

T. perlatus may easily be distinguished from *T. sabulosus,* whicr it resembles in size, by the large shining callosities on the elytra, which, when not abraded, bear a few short black setae; in *T. sabulosus* these setae are yellowish. The fringes of the thorax and the long hairs on the first joint of the antennae are also black in *perlatus* and yellow in *sabulosus.*

Bournemouth.
July, 1929.

SYSTEMATIC NOTES ON THE *BORBORIDAE* (DIPTERA), WITH DESCRIPTIONS OF NEW SPECIES OF *LEPTOCERA* (*LIMOSINA*).

BY O. W. RICHARDS, M.A., F.E.S.

Kroeber (Konowia, vii, 1928, p. 117) has recently described a genus *Leptocera* in the Therevidae. This name is preoccupied by *Leptocera* Olivier (1813) in the Borboridae. For Kroeber's genus I propose the new name **Epileptocera.**

Dr. O. Duda, in his revision of the European species of *Borborus* (Arch. f. Naturges, 89 A, Heft 4, 1923, pp. 35-112), sinks *Copromyza* (*Borborus*) *fumipennis* Stenhammar (1854) as a synonym of *C.* (*B.*) *sordida* Zetterstedt (1847). In the Hope Department of the Oxford University Museum are a male and female of *B. fumipennis* brought back from Spitsbergen by the Oxford University Expedition (1924) (see J. E. Collin, Ann. Mag. Nat. Hist., (9) 16, 1925, p. 336). These specimens were captured by Mr. C. S. Elton at the head of King's Bay, Deer Bay Island, 7 July, 1924, on a dead fox. The species is evidently distinct from *B. sordidus* and is in some respects more closely allied to *B. opacifrons* Duda (1923). These three species may be separated as follows:—

1. Preapical bristles of the hind tibiae well over twice as long as the distance from their bases to the apex of the tibia. Apical spur of the hind tibia reaching to the apex of the metatarsus in the male; longer than usual in the female. Bristles of the head longer. Colour black. Halteres yellow .... *B. opacifrons* Duda.
   Preapical bristles of the hind tibiae twice as long as this distance or shorter. Apical spur of the hind tibiae shorter. Bristles of the head all short. Colour bronzy 2
2. Preapical bristles of the hind tibiae about twice as long as the distance from their bases to the apex of the tibia. Inferior orbital bristles as long as the ocellar bristles, which are themselves longer. Wings infuscated. Halteres brown. Colour rather shining bronze .... *B. fumipennis* Stenh.
3. Preapical bristles of the hind tibiae about as long as this distance. Inferior orbital bristles shorter than the ocellar bristles. Wings hyaline. Halteres pale yellow. Colour very dull bronzy .. *B. sordidus* Zett.

A small *Leptocera* (*Limosina*) which I caught in the Auvergne in 1926 appears not only to be undescribed but to form a new subgenus.

Philocoprella, n. subgenus of *Leptocera* Ol.

Scutellum (fig. 1) with four large marginal bristles and a pair of hairs between the apicals, a single hair between each apical and lateral, and a pair of hairs on the disc. Mid metatarsus with a ventral bristle near the base. Third vein very strongly curved forwards on to the costa, which far overpasses it. This subgenus is allied to *Coprophila* Duda (1918) and is intermediate between it and the more normal members of the genus.

FIG. 1. Scutellum of *Leptocera* (*Philocoprella*) *arvernica*, n. sp.

Leptocera (*Philocoprella*) *arvernica* n. sp. (Type of the subgenus.)

Head with bristles as in *Leptocera*; vibrissa thick, one jowlar bristle almost as strong as the vibrissa; external vertical bristle very short; postvertical bristles very short and set rather farther back than usual; eyes small, bare; antennae divergent, with a short-haired arista of medium length. Thoracic chaetotaxy

without special features; one stout and two moderate humeral bristles; one pair of dorsocentrals, six rows of acrostichals, of which a pair of bristles in front of the scutellum are enlarged; one minute sternopleural bristle; one bristle of the pair arising from the base of the costa is larger than the other. Wings (fig. 2) with short hairs on the basal sector of the costa; second vein very short, straight, as long as the second costal sector, which is no longer than the first; third vein very strongly bent up on to the costa, ending far before the apex of the wing, overpassed by the costa by fully as long as the second costal sector; third costal sector about twice as long as the second; fourth vein shortly produced beyond the cell, traceable in an unpigmented condition to near the wing margin; fifth vein just produced beyond the cell; the cell not at all narrow; posterior crossvein two-thirds as long as the distance from it to the anterior crossvein; sixth vein just traceable, strongly divergent from the fifth; alula small, narrow; halteres pale brown. Mid tibiae dorsally with an anterodorsal bristle near the base and a pair (antero- and postero-dorsal) near the apex, the lower anterodorsal bristle being surmounted by another small one; ventrally with one centrally-placed bristle and a very short apical one; mid metatarsus with a ventral bristle near its base; tarsi not unusually short. Male genitalia of medium size, in this specimen retracted, but apparently with no long bristles. Length about 1 mm.

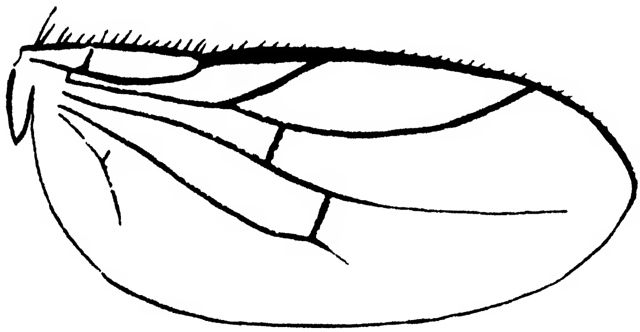


FIG. 2. The right wing of *Leptocera* (*Philocoprella*) *arvernica*, n. sp.

One male captured on cow-dung, Besse-en-Chandesse, Puy de Dôme, France, 23 July, 1926. Type in the British Museum (Natural History).

Dr. Duda (1918) has founded a subgenus *Opacifrons* of *Leptocera* (*Limosina*), and Spuler (Psyche, xxxi, 1924, p. 121) has fixed *Limosina coxata* Stenhammar (1854) as the type. *L. humida* Hal., which Duda also included, appears to me so different as to form a distinct subgenus. Some of the North American species described by Spuler (loc. cit.) would appear to be allied. These two subgenera may be separated as follows:—

· On each side of the vertex a pair of long bristles inside the inferior orbitals (between them and the frontals). A pair of enlarged acrostichals in front of the suture. Female with (male without) a preapical ventral bristle on the mid tibiae. **Spinotarsella** n. subg. Type *Limosina humida* Haliday (1836).

On each side of the vertex no such long bristles, only the usual microscopic hairs inside and below the inferior orbitals. No enlarged acrostichals in front of the suture. Female (like the male) with no ventral bristles on the mid tibiae. Subg. **Opacifrons** Duda (1918). Type *Limosina coxata* Stenhammar (1854).

The following British species of *Leptocera* appear to me to be undescribed. As I have a revision of the British Borboridae ready for the press, the descriptions given here are short. In my forthcoming paper they will be supplemented with figures.

Leptocera cambrica n. sp. ♂ ♀.

Allied to the group of *L. crassimana* Hal., but intermediate between that group and that of *L. luteilabris* Rndi. The bristles on the dorsal surface of the mid tibiae towards the apex alternate as in *L. crassimana* (not paired as in *L. luteilabris*). Alula narrow as in *L. luteilabris*. Second vein hardly sinuate; third costal sector about as long as the second. Pregenital sternite of the male with a long, outstanding, tapering bristle on each side; three long bristles on each side of the anus. Length 1.5 mm.

One ♂ (type), 1 ♀ on a piece of sheep's skin, Hepster Valley, Brecon, 22 April, '27 (O.W.R.); 1 ♂ New Forest, Hants, Aug., '20 (C. G. Lamb), in the Cambridge University Museum; 1 ♀ Llangrwnyr, nr. Crickhowell, Brecon, 10 Aug., '10 (J. W. Yerbury), in the collection of Mr. J. E. Collin. The type has been deposited in the British Museum (Natural History).

Leptocera (*Thoracochaeta*) *penteseta* n. sp. ♀.

Intermediate between *L. zosterae* Hal. and *L. brachystoma* Stenh. These three species may be separated as follows :—

1. Larger species. Hind tibiae with three or four long exserted bristles. Two pairs of moderately strong bristles behind the ocelli, more strongly developed in the female. Mid tibiae dorsally with three pairs of bristles. Second costal sector about one and a half times as long as the third, with a ventral fringe of long bristles, and dorsally with three long ones at right-angles to the wing-surface. Two anterior dorsocentral bristles incurved. Cerci in the female with short apical hairs .... *L. zosterae* Hal.
   Hind tibiae with short hairs only. No strong postocellar bristles. Mid tibiae dorsally with the posterior bristle of the central pair missing 2
2. Moderate-sized species. Bristles of the female cerci very long. Second costal sector twice as long as the third, with a ventral fringe and dorsally with seven long bristles at right-angles to the wing-surface. One large pair and two small ones of dorsocentrals behind the suture, one large pair, not incurved, in front of the suture .... *L. penteseta* n. sp.
   Small to very small species. Bristles of the female cerci not very long. Wings and dorsocentrals as in *L. zosterae*, though the dorsocentrals are much shorter .... *L. brachystoma* Stenh.

L. penteseta has dark brown wings and yellow halteres; the second vein is gently curved forwards along its whole length; the cell is narrow, and the posterior cross-vein is about half as long as

the distance from it to the anterior one; the third vein is straight and a trifle overpassed by the costa. Length 2.25 mm.

One ♀, Island of Correggan, Isles of Scilly, 12 July, 1927 (O.W.R.), in the nest of a cormorant, with *L. zosterae.* The type is in the British Museum (Natural History). The type of *L. ciliosa* Rondani (1880), which is said by Rondani to have the second costal sector equally elongate, has been re-examined by Villeneuve (Wien. ent. Ztg., xxxiii, 1914, p. 207), who found no differences from *L. zosterae.*

L. grenstedi n. sp. ♀.

Dr. Duda (Verh. Zool. Bot. Ges. Wien, 73, 1923, p. 174) described a *Leptocera denticulata.* In 1927 he identified for me as this species a male and two females captured by the Rev. L. W. Grensted in England. Later I discovered that the male (which has genitalia like those figured by Duda in his original description) possessed an extra minute bristle at the base of the scutellum on each side. The females had four scutellar bristles as usual. More recently I have seen females possessing the extra scutellar bristles, and these I regard as the true females of *L. denticulata.* The females captured by the Rev. L. W. Grensted also differ in the structure of the terminal segments of the abdomen, but are otherwise identical with *L. denticulata* except for the scutellum. The size (length 1.25 mm.) is about the same. For this new species I propose the name *L. grenstedi.* Type ♀ Taunton, Somerset, 25 July, '27 (L.W.G.), deposited in the British Museum (Natural History); 1 ♀ Redesmere, Cheshire, 5 Aug., '27 (L.W.G.), in my collection. Both specimens were obtained on cow-dung.

L. grenstedi Richards, var. *simplex,* n. var. ♀.

Two further females which I captured on cow-dung in Epping Forest, Essex, 18 Sept., '27, appear to be allied to *L. grenstedi.* They are absolutely identical except in the structure of the abdomen. In the variety the cerci, instead of being separate, are fused to form a triangular sclerite; the two preceding sclerites are broader and less crescent-shaped than in the type, and are much more strongly chitinized than the basal segments. This variety may well be a distinct species, but far more material is required before this group can be satisfactorily worked out. The type of the variety is in the British Museum (Natural History); the paratype in my collection.

Leptocera collini n. sp. ♂ ♀.

Dr. Duda (Konowia, vii, 1928, p. 172) described a new species of *Leptocera, L. lambi,* from a male and female captured by Dr.

C. G. Lamb in the New Forest, Oct., 1903. I have specimens of another species which is very closely allied to *L. lambi*. The identity of *L. czernyi* Duda (1918) raises certain difficulties. It was described from a single female in bad condition. Neither Dr. Duda nor I have been able to compare either *L. lambi* or *L. collini* with the type of *L. czernyi*, and in the former case Dr. Duda had some doubt as to the distinctness of the two forms. Since *L. collini* differs from *L. czernyi* in the same venational characters as Dr. Duda gives on pp. 171-2 as distinctive of *L. lambi*, but in a more marked degree, I feel sure that *L. collini* at any rate is distinct. It differs from *L. lambi* as follows:—

1. Larger species. Wings hyaline. Second vein rather strongly sinuate; second costal sector hardly longer than the third; cell broader; anterior cross-vein half-way between the posterior cross-vein and the base of the third vein .... *L. lambi* Duda.
2. Smaller species (length 1.25 mm.). Wings tinged with fuscous. Second vein hardly sinuate; second costal sector one and a third times as long as the third; cell narrower; anterior cross-vein usually nearer to the base of the third vein than to the posterior cross-vein .... *L. collini* n. sp.

Of this species I have seen 2 ♂ and 3 ♀, which I captured on cow-dung in Epping Forest, Essex, 18 Sept., 1927. One of the females is the type and has been placed in the British Museum collection. Further, Mr. J. E. Collin captured an immature female at Aldeburgh, Suffolk, 25 May, 1910.

Evreham Lodge, Iver, Bucks.
July 5th, 1929.

A NEW BRITISH TACHINID FLY, *PACHYOPHTHALMUS SIGNATUS* MEIGEN.

BY O. W. RICHARDS, M.A., F.E.S.

This interesting fly has long been known as a parasite of Aculeate Hymenoptera. Chevalier (Bull. Soc. sci. Seine et Oise, Sér. 2, V, 1924, pp. 56-8, 73-7) has recorded *Odynerus callosus* Thoms., *Trypoxylon attenuatum* Sm. and *Tachysphex pectinipes* L. as hosts. In the case of *Trypoxylon*, the fly was seen to perch a few centimeters away from the entrance of the nest, which was entered as soon as the owner flew off. The fly only stayed in the burrow for about two seconds, apparently depositing a larva, which made its own way into the cell. Lundbeck (Diptera Danica, VII, 1927, pp. 238-9) bred the same species from the nest of an *Odynerus*, probably *O. reniformis* Gmel. Myers (Ent. Mo. Mag., LXIII, 1927, pp. 190-6) has studied the habits of *Pachyophthalmus* in U.S.A., where he found it parasitic upon *Odynerus catskillensis* Sauss. He also gives references to several other observers who

have found *Pachyophthalmus* parasitizing Eumenid wasps. Ferton (Ann. Soc. ent. France, LXXX, 1911, p. 369), on the other hand, found the same fly as the prey of *Oxybelus sericomarginatus* Kohl.

On June 9th, a fine sunny day, I caught two males in my garden here. The behaviour of one of these, which gave a perfunctory chase to a male *Andrena,* made me think the fly must be a Miltogrammid, though on the apple leaves where it was sitting it more resembled a small *Sarcophaga.* Later in the morning two female specimens were seen hovering behind a female of *Odynerus callosus* Thoms., which was examining a hole in the brick wall. The flies hovered one behind the other in a very characterstic way, maintaining themselves about six inches from the wasp. All three were caught in one stroke of the net. Not long afterwards another female *Pachyophthalmus* was caught hovering behind a female of the same wasp. In the afternoon two separate females of *Pachyophthalmus* were captured in the same way when in attendance on females of *Trypoxylon figulus* L. In one case the fly was first observed seated on a rhubarb leaf. A female *Trypoxylon* approached and began running up and down the leaves near. The *Pachyophthalmus* soon appeared to see it and began hovering behind it. I received a very definite impression that the fly *saw* the wasp and took no notice of it when it was hidden or when too far off. Presumably this behaviour leads eventually to the discovery of a nest which the wasp is in progress of provisioning; the fly then stays near the nest, and its behaviour is now that described by Chevalier and Myers.

In June, 1928, I bred a *Pachyophthalmus signatus* from a puparium found in the nest of *Odynerus spiricornis* Spin. at Ste. Enimie, Lozère, France, on 13th August, 1927.

In Mr. Wainwright's key to the British Tachinids (Trans. Ent. Soc. London, LXXVI, 1928) *P. signatus* runs down at Section 181 (p. 171) to *Sphecapata.* It differs from that genus in having the head rounded in profile, the eyes more approximated, the frontalia black, the body grey, not yellowish. *P. signatus* has three very distinct black stripes on the thorax. I am much indebted to Mr. Wainwright for confirming my identification of the fly. He tells me, also, that he knows of two specimens that he had previously regarded as only doubtfully of British origin. Since the above was written I have captured a female *Pachyophthalmus* at the Imperial College Biological Field Station, Slough, Bucks.

Evreham Lodge, Iver, Bucks.
June 27th, 1929.

NOTES ON THE GENUS *POLYPEDILUM* KIEFFER (DIPTERA, CHIRONOMIDAE).

BY W. D. HINDES.

This genus was proposed by Kieffer in 1913 for the reception of those species of the old genus *Chironomus* which possessed what appeared to be four pulvilli; it has since been pointed out, however, that there are only two pulvilli, each being branched and thus giving rise to the appearance of four.

Polypedilum may be briefly characterised thus :—

Antennae (♂) 14-jointed, (♀) 6-jointed ; posterior tibiae with one spur and a comb with the spines free at the apex only; pulvilli two, forked, giving the appearance of four; squamae fringed with hairs; wings with R2+3 reaching costa at or near apex of R; hypopygium with long bristles on inner margin of terminal segment (clasper) and inferior appendage terminating in a long apical bristle.

Goetghebuer (Faune de France, Chironomariae, 1928) places this genus next to the *Tanytarsus* group, to which in many respects it is allied, but the interpolation of the genera which have 12-jointed antennae between *Polypedilum* and the rest of the 14-jointed genera seems to me a little unsatisfactory, in view of the affinity between *Polypedilum, Microtendipes* and *Endochironomus.*

The following table will serve to distinguish the species known to me; their discrimination is fairly easy, but an examination of the hypopygium is necessary for absolute certainty, as several closely allied species may be found which I have not seen. Goetghebuer (l.c. 1928) gives good figures of the hypopygia, to which I refer those interested.

Goetghebuer (l.c.) gives *leucopus* Mg. as British, but as I have not yet seen a specimen I do not include it in my table.

P. quadrimaculatum Mg., found in Belgium, Germany and Austria, should occur with us.

TABLE OF SPECIES.

1. Wings spotted or clouded 2
   Wings unmarked 4
2. Wings three-spotted ; spot between R4+5 and M not covering fork ; small species less than 4 mm. .... *scalaenum* Schrnk.
   Wings not three-spotted ; spot between R4+5 and M covering fork ; larger species 3
3. Dull black species with yellow legs .... *nubeculosum* Mg.
   Dark brown species wi h brown legs and white-ringed abdomen .. *laetum* Mg.
4. Insect yellowish in colour .... *convictum* Wlk.
   Insect not yellow 5
5. Abdomen brown-black with basal segments green ; legs yellow-green except distal half of anterior femora, which is blackish-brown .... *pedestre* Mg.

Abdomen all black, legs not coloured as above 6
6. Halteres with knob black-brown, legs brownish-black .... *arundineti* Goet.
Halteres completely whitish, legs yellowish .... *pullum* Zett.

P. nubeculosum Mg. (*enotatum* Wlk.). This common species swarmed at Ferry, Lake Windermere, in 1925. It is common in the Leeds district, and Mr. Grace took it at Coniston and Ilkley.

P. laetum Mg. (*falcigerum* Kieff.). Ilkley (Grace); Keighley (Butterfield); and Leeds district, common.

P. scalaenum Schrnk. Keighley (Butterfield). I took it sparingly at Harewood Bridge, near Leeds, and a single ♀ off hawthorn blossom in the New Forest.

P. pedestre Mg. (*patens* Wlk.). Common.

P. convictum Wlk. (*blandum* V. de Wulp.) and *P. pullum* Zett. are both common species, at least in Yorkshire.

P. arundineti Goet. The only specimen I have seen of this species is a ♂, taken at Keighley by Mr. Butterfield.

9 Grange Avenue, Chapeltown, Leeds.
July 10th, 1929.

ON *PHYSOTHRIPS LATUS* AND *P. PROPINQUUS* BAGN.

BY RICHARD S. BAGNALL, D.SC., F.R.S.E.

Whilst it is gratifying to notice the good work Mr. Morison is doing in describing the earlier stages of the British Thysanoptera in the pages of this Magazine and in other ways adding to our knowledge, I cannot but feel that he is too much inclined to pronounce opinions on synonymy in difficult genera such as *Chirothrips* and *Limothrips*, and also to follow Priesner without the fullest enquiry.

In such a difficult subject as the Thysanoptera, it is easy for all of us to fall into error, as indeed at times we must do, and I find that Priesner, who undoubtedly ranks amongst our foremost authorities, is prone to err in certain directions, errors for the most part due to his enthusiasm and energy, coupled with the desire to cope quickly with the large amount of material passing through his hands. For instance, he divides the genus *Aeolothrips* into three groups, *Pygaeolella* with *albicinctus* as type, *Aeolothrips* s. str. for the *fasciatus* group and *Podaeolella* for *versicolor*, quite ignoring the fact that as far back as 1832 Haliday (Ent. Mag. III, pp. 439-451) split the genus into two subgenera, *Coleothrips* for *fasciatus* and *vittatus* and *Aeolothrips* s. str. for *albicinctus*! Perhaps his commonest error (and one that is easily remedied) lies in shortly characterising perfectly good

species as varieties of known species, and this is indicated in his *Thysanoptera Europas* by the number of his varieties that he later raised to specific rank. Others remain to be so raised. In my opinion, for instance, his *Aptinothrips rufus* var. *mediterranea* is a distinct species strongly characterised by the form of the antennae in both sexes and in the chaetotaxy of the ♂, and, again, when I described a very distinct species of *Chirothrips* (*C. meridionalis* m.) from the Mediterranean, I was informed by Priesner (to whom I sent a paratype) that it was identical with his *C. manicatus* var. *pallidicornis* !

It is, therefore, desirable to establish synonymy, or to clear up any doubts that may exist in regard to several species, and as a beginning I will deal with the two species that are named in the title of this paper.

In his 'Observations and Records for some Thysanoptera from Great Britain, V,' *Physothrips* spp. (Ent. Mo. Mag., lxv, pp. 113-127, 1929) under the heading of '*Physothrips latus* Bagnall,' Morison says: 'Priesner (1926 Thys. Eur., pp. 315-318) considers that *propinquus* Bagn. is a variety of *latus* Bagn., since he finds no constant morphological difference between them,' and both authors consider that *propinquus* is the dark seasonal form of *latus*. But my *propinquus* is the lighter of the seasonal forms = *latus* Williams, Priesner, and Morison and the dark form is *foliorum* Pr. *in litt.*, and neither Priesner nor Morison have seen the true *latus*. As I pointed out in my original description of *propinquus*, that species is abundantly distinct in the larger size stronger and longer bristles, and especially in the chaetotaxy of the wings. Size in these small creatures (making every allowance for variation within certain limits) must remain an important factor, and my preparation of *latus* is readily separated from all my preparations of *propinquus* by the merest tyro without the aid of even a pocket lens.

The following is the synonymy followed by comparative measurements :—

Physothrips latus Bagnall.

Bagnall 1912, Journ. Econ. Biol.., vii, p. 191 ; Trans. Nat. Hist. Soc. Nd. & D'ham, n.s. IV, p. 346 ; Karny 1914, Zeit. Wiss. Ins.-Biol., p. 367 ; Bagnall 1921, Ent. Mo. Mag., lvii, p. 62.

Length c. 0.75-0.8 mm., breadth of pterothorax 0.22 mm., and of abdomen at widest 0.27 mm. General colour pale creamy yellow, much lighter than the palest *propinquus*. Setae shorter, finer and paler, those on hind-vein of fore-wings shorter than the spaces separating them.

Hab., England, Northumberland.

Physothrips propinquus Bagnall.

Physothrips latus Williams 1916, Entomologist, xlix, p. 280; *P. propinquus* Bagnall 1921, Ent. Mo. Mag., lvii, p. 62; 1923, l.c., lix, p. 57; *Taeniothrips latus* var. *propinquus* Priesner 1924-25, Kranchers Ent. Jahrb., p. 159; *T. latus* var. *propinqua* Priesner 1925, Konowia, IV, p. 148; 1926 Thys. Eur., p. 315 et p. 317; *Physothrips propinquus* Bagnall 1926, Ann. Mag. Nat. Hist., ser. 9, xviii, p. 650; *P. latus* Morison 1929, Ent. Mo. Mag., lxv, p. 123.

♀. Length c. 1.0-1.1 mm., breadth of pterothorax 0.25-0.26 mm., and of abdomen at widest 0.30.5-0.32 mm.

Setae longer, stouter and darker, those on hind-vein of fore-wings longer than the spaces separating them.

Hab., ENGLAND, SCOTLAND, AUSTRIA (*Priesner*) and FRANCE (*Bagnall*).

The following measurements in $\mu\mu$ refer to the type examples of each species, and as regards Scottish and other English examples of *propinquus* the fore-wing bristles are generally somewhat longer and the spaces between those on the hind-vein shorter, and in no case is there any approach to the condition seen in *latus*.

Length (and breadth) of antennal joints.	♀ *Physothrips latus* type.	♀ *Physothrips propinquus* type.
3	42.5 (20)	50 (22)
4	37 (20)	41.3 (22)
5	c.29 (20)	33-35 (22)
6	42.5 (20)	52 (22)
7	8.8 (c.8)	10 (9.5)
8	12.5 (6.3)	15 (6.8)
Length of bristles:—		
Cephalic:—		
Interocellar	47.5	60
Postocular, outer ...	37.5	47.5
,, inner ...	27.5	30-32.5
Pronotal:—		
Anteromarginal	25	35
Mid-lateral	28.8	35-37.5
Postero-angular	42.5-45	67.5-75
Abdominal:—		
Segment ix	75-88	90-115
,, x	75	93
Length (and breadth near middle) of fore-wing	575 (44)	740 (58)
Length (and breadth of space between them) of bristles on—		
(*a*) costa	c.47.5 (28-30)	50-55 (30-37)*
(*b*) hind-vein	30-34 (c.47.5)	45-55 (30-35)

Edinburgh.

July 9th, 1929.

* In one wing of the type example the bristles on the costa medianly are separated by a short space and a longer alternately, but this is not the normal condition.

Early appearance of Pyrameis atalanta and Plusia gamma.—In the July issue of the Ent. Mo. Mag. Mr. A. H. Hamm records *Pyrameis atalanta* as having been seen feeding at blackthorn blossom in Bagley Wood on April 27th of this year. On the same date I saw one of the same species, also feeding on blackthorn blossom, on Badbury Rings, Dorset; it was keeping more or less to the same clump of bushes for the hour or two that I was there.

A far more remarkable early appearance of this butterfly is recorded in my journal. When I was out for a walk with my brother on February 18th, 1927, at Ponghill, near Bude, I saw one which, though rather faded in colour, was quite unchipped and in excellent condition; I was unable to note the sex. There can be little doubt that this individual had hibernated in England.

But I was even more surprised than I was on seeing this insect when, on March 11th of this year, during the sudden spell of very warm days which came immediately after the great frost, I saw a decrepit *Plusia gamma* busily feeding at snowdrop flowers at about 3 p.m. in a garden at Parkstone, Dorset. I have never heard of *P. gamma* hibernating in England. There was no mistaking the species; it was feeding within four or five yards of me for some minutes and I walked up and examined it closely.—H. Leslie Andrewes, The Warren, Bere Regis, Dorset: *July 12th*, 1929.

Ameletus inopinatus Eat. and Leptophlebia respertina L. in Westmorland.—A single ♂ of the former was taken at the head of Brothers Water on 20th June last. The standing of this species as a British insect rests hitherto on the record of a single specimen taken at Loch Rannoch by C. A. Briggs on 8th June, 1898 (vide E.M.M. 1899, p. 70). *A inopinatus* appears to be a rare species even on the Continent, Eaton's description being based on a ♀ from the Black Forest and a ♂ from the Vosges, both taken by McLachlan; it was subsequently taken by Eaton in South Norway and by E. Strand in Arctic Norway, while Klapálek gives the Tatra Mountains as locality. *Leptophlebia vespertina* L. (*meyeri* Eat.), introduced to the British List by Briggs on the same occasion, was found in numbers near Skelwith on June 24th, but this species, though published records are few, is more widely distributed over the country. I have notes of the following records:—Scotland: Strathglass (King, 1900). England: Yorks, Scarcroft Lake and Austwick Moor (Percival and Whitehead, 1927); Cheshire, Hatchmere (H. Britten); Suffolk, Redgrave Fen (N. C. Rothschild); Hants, Denny Bog (A. E. Eaton and W. J. Lucas), Ober Water (W. J. Lucas).—K. G. Blair, 120 Sunningfields Road, Hendon: *July 2nd*, 1929.

Unusual Nests of Vespa norvegica Fab.—In his 'Hymenoptera Aculeata of the British Isles,' p. 156, E. Saunders quotes Mr. (now Prof.) Newstead as recording an embryo nest of *Vespa sylvestris* Scop. which was built of blue paper. This year one of my students brought to me from Seamer, near Scarborough, a nest of *Vespa norvegica* Fab. which was one of three similar nests, all of a beautiful uniform sky-blue. The fact that these nests were also blue, like Newstead's, was probably pure coincidence; it may, however, be due to a special liking of wasps for blue paper, or conceivably to the possibility that the wasps had used as a source of their nesting-material wood which had been stained by fungoid growth. It is well known, for example, that the Discomycete *Chlorosplenium aeruginosum* De Not stains fallen branches of oak, ash and hazel a deep verdigris-green, and it is possible that, under the chemical action of the wasp saliva, this turns blue.

At Gillamoor, near Kirby Moorside, wasps of the same species (*V. norvegica*) have this year used confetti from the neighbourhood of the church as a partial source of their paper, and have incorporated whole flakes of it with their normal

paper, so giving their nest a particoloured appearance. This nest was unfortunately destroyed.

Last year *V. norvegica* built a nest hanging from the upper portion of a window-frame in this suburb of Scarborough, but after it had been made nearly as big as a child's fist either the nest was deserted or else the queen was destroyed while away foraging.—GEO. B. WALSH, Stepney Drive, Scarborough: *July 17th, 1929.*

Reviews

'A LIST OF THE MICRO-LEPIDOPTERA OF THE OXFORD DISTRICT.' By E. G. R. WATERS, M.A., F.E.S. Pp. 1—72. Oxford: Published by the Ashmolean Natural History Society of Oxfordshire: Holywell Press, Ltd., 1929.

The entomological exploration of those portions of Oxfordshire and Berkshire adjacent to the ancient city of Oxford is, at the present time, probably as complete as that of any similar district in the British Islands, and few areas of equal extent have yielded so great a number of rare and interesting insects of all Orders, to the systematic and intensive collecting and research which has been carried out in recent years by its resident Entomologists. This statement is fully borne out by the list of the conveniently so-called 'Micro-Lepidoptera' observed within the ten-mile radius from the centre of the city. The list now under notice has been compiled by one of our Editors, in the main from his own researches since the year 1908, augmented by all available records by other collectors and students of this group of moths, past and present, whose assistance is amply and gracefully acknowledged; as well as by the information afforded by several important local collections acquired in recent years by the Oxford University Museum. Comprising as it does the Pyrales, Crambites, and 'Plume-Moths,' no fewer than 762 out of the 1,318 species of 'Micro-Lepidoptera' recognised as British, or nearly 58 per cent. of the whole, are included in the list as having undoubtedly occurred in this limited area, while some thirty more are noted in an 'Appendix' as having been recorded in error, or as otherwise requiring further confirmation. The arrangement and (with a few trifling exceptions) the nomenclature of the List is that of Meyrick's 'Revised Handbook of British Lepidoptera,' and to every species enumerated, definite localities, dates of capture, initials of captors other than the author, and in most cases the habitat, food-plant, and other interesting details of life-history, are appended. In the Introduction, the author draws attention to the rapid change in the character of the Oxford country, and its too evident deterioration from the point of view of the Entomologist, by the absorption or complete destruction in recent years of many of the most productive localities, and the consequent disappearance of some of the most interesting insects—a change for the worse which the present writer can confirm only too fully from his own experience with the Coleoptera. A debt of gratitude is due to the Ashmolean Natural History Society for the publication, in their Annual Report for 1928, of this List, which will be duly appreciated by all Entomologists as one of the most important and interesting contributions to the knowledge of our smaller moths that has appeared in recent years, and we heartily congratulate our esteemed colleague on its production.—J.J.W.

'NOTES ON THE BUTTERFLIES OF BRITISH HONDURAS.' By F. L. Davies, F.E.S., M.R.C.S., L.R.C.P. (Lond.) (late British Honduras Medical Service). London: Old Royalty Book Publishers (Henry Walker), John Street, Adelphi. 1928.

In this modest little book the experiences of a collector of butterflies, resident for more than thirty years in one of the least-known, from a faunistic point of

view, of our tropical British possessions are embodied. It is therefore of considerable value as an addition to our knowledge of the Lepidoptera of a region apparently visited by few naturalists or collectors, although the species of butterflies here dealt with, some 255 in number, almost certainly represent a bare moiety of those which will eventually be found to occur within the limits of British Honduras. Many of them are dismissed in a line or two at most, but some, as in the case of the Papilios, of which genus twenty-six species were met with by the author, as well as certain Pierines, Nymphalines, etc., are treated in greater detail, and interesting notes of the habits of some of the butterflies are given. In the Introduction we find useful practical hints on collecting and preserving butterflies under tropical conditions; and the precautions here detailed against snakes, ticks, mosquitoes and other pests characteristic of the tropical jungles, as well as against the dangers arising from the climate, are the outcome of the author's long experience in this region. A somewhat rough but very convincing enlarged figure in colour of the striking *Pieris viardi* Boisd. ♀ forms an appropriate frontispiece to this useful little work.

'TYPICAL FLIES: A PHOTOGRAPHIC ATLAS OF DIPTERA.' By E. K. Pearce, F.L.S., F.E.S. Series III. Cambridge: at the University Press. 1928.

The third series of this very useful work on our native Diptera sustains the high standard of pictorial excellence reached by its two predecessors. About 130 species, including certain of the finest and most conspicuous two-winged flies occurring in our Islands, with details of the life-history of some of these, are depicted on a more or less enlarged scale by direct photography in this volume; the difficulty in securing a clear and well-defined picture, presented by the convexity of the bodies of the insects, having been successfully surmounted in nearly all the figures, even with such large and stout species as *Tabanus bovinus* and *T. sudeticus*. The variegated patterns of the wings of many forms, as well as the all-important details of neuration, are here exhibited with a fidelity which leaves little or nothing to be desired. A few very pleasing views of favourite localities for rare or interesting Diptera greatly enhance the value and interest of this series of illustrations. The preface to the first series of the work, which embodies the author's excellent directions as to the pursuit, preservation and photographing of two-winged flies, is repeated in the present volume, and concise details of dimensions, colour, habitat, and other particulars are appended to the figure of each insect. To those who are commencing the study of our native Diptera, or who wish to acquire some knowledge or this important Order of Insects, 'Typical British Flies' is a work highly to be commended.

Societies.

ENTOMOLOGICAL CLUB.—A meeting of the Entomological Club was held at Hodeslea Meads, Eastbourne, on June 1st, 1929, Mr. Robert Adkin in the Chair. Members present in addition to the Chairman: Mr. Horace Donisthorpe, Mr. H. Willoughby Ellis, Mr. James E. Collin and Mr. W. J. Kaye. Visitors: Mr. F. W. Frohawk, Mr. R. A. Adkin, Dr. R. R. Armstrong, Dr. Malcolm Burr, Dr. J. Waterston, Mr. H. L. Rayward, Mr. G. C. Leman, Mr. E. C. Bedwell, Mr. W. Rait Smith, Dr. J. M. Aldrich, Dr. K. Jordan and Mr. N. D. Riley.

Owing to family illness, the Chairman's residence was only available for a portion of the entertainment of the guests.

On Saturday, June 1st, the members and guests met at the Grand Hotel to luncheon in a private room, and in the afternoon, in fine weather, the whole party joined in a most enjoyable ramble on the Downs towards Beachy Head.

The Club members returned to Hodeslea at 5 p.m. for the business meeting of the Club. At 6.30 the Club Supper was held at the Grand Hotel, in a private room, during which Dr. Aldrich, Professor of Zoology, Washington, U.S.A., communicated an interesting note as follows:—

'Mr. J. M. Aldrich exhibited a specimen of the fly *Melanderia mandibulata* Ald., which belongs to the family Dolichopodidae and is found on the ocean beach on the west coast of the United States, near the mouth of the Columbia River. The fly is remarkable in possessing labial structures which resemble mandibles and are, in fact, mandibular in function, being used to grasp and hold the prey. Since true mandibles are absent in the entire Dipterous order, the development of a substitute organ in this unique case emphasizes the law that a structure once lost in evolution cannot be regained.'

A most enjoyable evening was spent, and those who did not remain for the week-end took late trains to London and elsewhere. Those who were able to remain were accommodated at the Grand Hotel, and on Sunday, after breakfast, a collecting trip was arranged to Whiteway Woods in rather dull weather, and insects generally were found to be very scarce. Nests of *Bombyx neustria* and many other lepidopterous larvae were noted, amongst which one specimen only of *L. sibylla* was seen in a shady part of the wood. The woods are privately owned and are becoming very much overgrown with small trees and shrubs, and as the woods are open to the public much damage appears to be done during holiday times and large quantities of wild flowers are wantonly gathered and wasted by the visitors. At one o'clock the cars left the wood for lunch at Hodeslea, and a very pleasant time was spent in the Chairman's garden, where many flowers grow in profusion. At 7.30 dinner was provided at the Grand Hotel, in the dining room, after which the guests were entertained in the lounge.

On Monday morning breakfast was provided at the Grand Hotel, and the guests departed during the morning, after a most successful and entertaining meeting.—H. WILLOUGHBY ELLIS, *Hon. Sec.*

ENTOMOLOGICAL SOCIETY OF LONDON: *Wednesday, June 5th,* 1929.—Dr. K. Jordan, President, in the Chair.

The deaths of Sir A. Buchan-Hepburn and of Mr. F. Cocks, Fellows of the Society, were announced.

The President announced that Mr. F. J. Griffin had been appointed Registrar of the Society as from the 1st July, 1929, from which date the new Bye-Laws passed at the Special Meeting held on the 5th April, 1929, would take effect.

Lt.-Col. the Viscount Hood, 61 Porchester Terrace, W.2., was elected a Fellow of the Society.

Mr. H. E. Andrewes drew attention to an error made by him in recording *Trechus cardioderus* Putz. as a British species in an exhibit made before the Society on the 4th June, 1924. Mr. H. Donisthorpe exhibited two new species of *Anaspis* and other rare beetles from Windsor Forest. Professor E. B. Poulton, F.R.S., communicated: (1) On behalf of various Fellows and others, a number of notes on birds and other predators destroying butterflies and other insects. (2) On behalf of Miss Balfour, *Odynerus* sp. nesting in a bookcase. (3) On behalf of Mr. G. Talbot, the proportions of *Pseudacraea poggei* and its model in Angola. (4) On behalf of Mr. H. W. Simmonds, notes on *Hypolimnas bolina* in Fiji. (5) On behalf of Mr. A. M. Lea, notes on Australian Lycids and their mimics. (6) On behalf of Mr. C. S. Elton, notes on Aphids and Syrphids in Spitsbergen in 1924. Dr. J. M. Aldrich, of the U.S. National Museum, exhibited larvae of the Saturniid, *Coloradia pandora* Blake, which are still used as food by Indians in California. He also showed an example of the Dolichopodid fly, *Melanderia mandibulata* Aldrich, which has the lower part of the labium

developed into structures that function as mandibles. Dr. R. Stewart MacDougall exhibited and made remarks on *Neoclytus capreae* and other Longicorns infesting timber. Dr. H. Scott gave an account, illustrated by numerous slides, of 'An Entomological Excursion into Basutoland.'—S. A. Neave, *Hon. Sec.*

AN ANNOTATED LIST OF THE ADDITIONS TO THE BRITISH COLEOPTEROUS FAUNA, MADE SINCE THE PUBLICATION OF THE SUPPLEMENTARY VOLUME (VI) OF FOWLER'S 'COLEOPTERA OF THE BRITISH ISLANDS.'

BY HORACE ST. J. DONISTHORPE, F.Z.S., ETC.

WITH EIGHT PLATES.

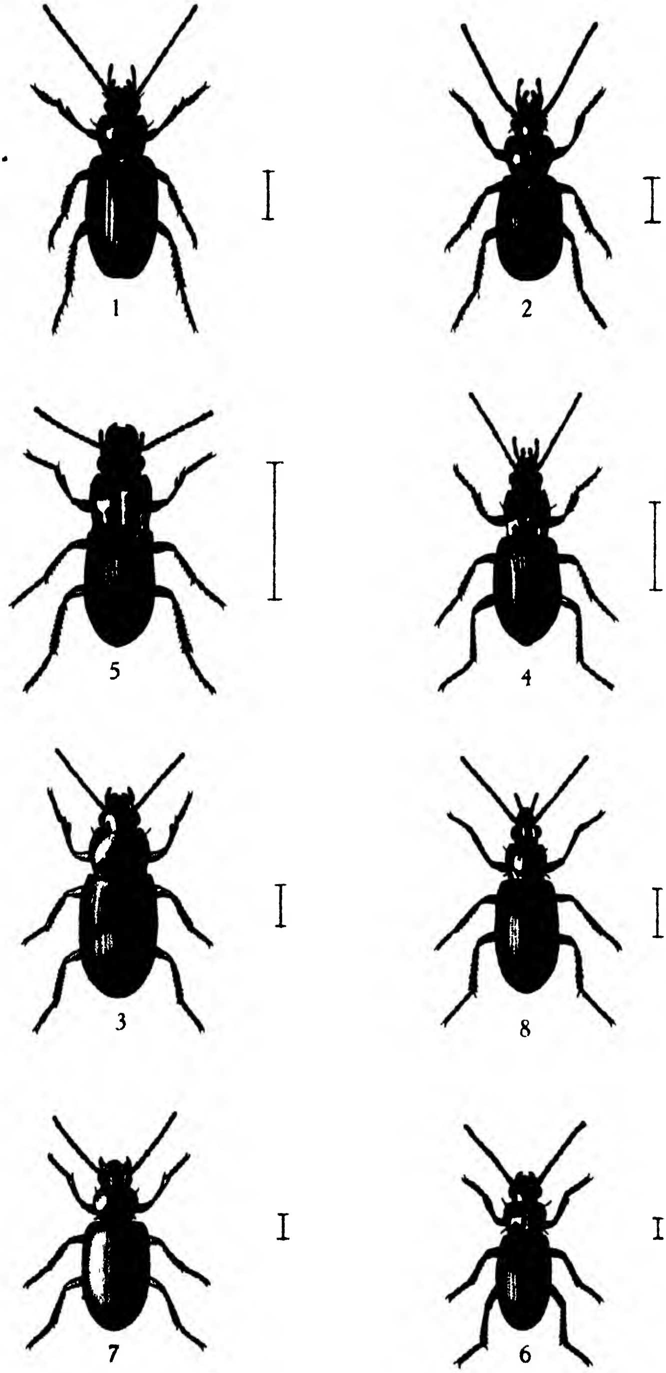
INTRODUCTION BY JAMES J. WALKER, M.A., R.N., F.L.S.

Sixteen years and upwards have elapsed since the appearance of the 'Supplementary Volume' by the late Canon W. W. Fowler and Mr. H. St. J. Donisthorpe, in which the 'Coleoptera of the British Islands' of the first-named writer was then fully brought up to date. The value of this important entomological treatise was thus greatly enhanced, and there can be little doubt but that the students and collectors of our indigenous beetles, already familiar with the earlier volumes, were stimulated and encouraged in their researches in a marked degree by this notable extension of the most comprehensive and useful work on the subject that has yet appeared.

The outbreak of the Great War, little more than a year after the publication of the 'Supplementary Volume,' deprived us of a considerable number of our younger entomologists, some, alas, destined never to return; and in the years that have elapsed since the book appeared many of the 'veteran' workers in the Order have passed away. Among these the names of Canon Fowler, Dr. David Sharp, and Mr. G. C. Champion stand out pre-eminent in the study of our indigenous Coleoptera, and they have left their mark for all time on its history. The names of Dr. T. A. Chapman, James Edwards, the Rev. H. S. Gorham, O. E. Janson, George Lewis, E. A. Newbery, W. E. Sharp, E. A. Waterhouse, and the Rev. Theodore Wood, now gone from us, may be mentioned among those who have contributed most largely to our knowledge of British beetles during comparatively recent years.

Notwithstanding these inevitable gaps in the ranks of our Coleopterists, the collection and study of the Order has been of late pursued more strenuously than ever if possible, both by the older workers still with us and by the energetic and capable young Entomologists who devote their attention to this most important

Ent. Mo. Mag. 1929, Plate A.



B. Hopkins del. P. J. Mulder & Son., Leiden, lith.

COLEOPTERA NEW TO THE BRITISH LIST 1913-1929.

and interesting division of the Insecta. Judging by the number of additions to our Fauna that have been made by their joint exertions since the 'Supplementary Volume' appeared, there seems good ground to suppose that the opinion expressed in the Preface by the late Dr. Sharp, that our indigenous species of beetles will be found in the future to number at least 4,000, will ere long be justified.

The additions to the list of British Coleoptera brought forward in our Magazine, from the years 1913 to 1928 inclusive, amount to no fewer than 143 species (18 of which are introductions by commerce, etc.) and 26 named varieties. These include such remarkable and conspicuous forms as *Pterostichus angustatus, Abax parallelus, Hygropora cunctans, Aulonium ruficorne, Scaphium immaculatum, Lycoperdina succincta, Elater praeustus, Leptura rubra, Cassida sanguinosa, Otiorrhynchus porcatus, Anchonidium unguiculare, Anthonomus cinctus, Stenopelmus rufinasus, Dryophthorus corticalis*—to name only a few—and the occurrence in our islands of these and other equally important species recorded elsewhere is, to my own mind at least, conclusive evidence that we have by no means exhausted our list of indigenous beetles, and that many interesting members of the Order remain yet to be discovered in our own country.

During the same period a very considerable number of species new to Britain have been brought forward in the pages of our contemporary magazine, the 'Entomologist's Record.' Practically the whole of these are introduced by Mr. H. St. J. Donisthorpe, whose enterprise and energy in collecting in recent years have been rewarded by an unprecedented number of valuable additions to our Coleopterous Fauna. In particular, his exhaustive researches in Windsor Forest, that splendid old hunting-ground which has scarcely been investigated at all since the days of James Francis Stephens nearly or quite a century ago, have resulted not only in the 'revival' of many rarities first recorded from thence by that famous entomologist (in many cases by himself alone), but in the discovery of quite a number of unexpected novelties, including a most interesting little assemblage of Staphylinid and Pselaphid guests of the ant *Acanthomyops* (*Donisthorpea*) *brunneus*, itself a quite recent addition to the British fauna from the same locality.

In view of these important contributions to the knowledge of our British beetles, distributed as they are over so many volumes of two of our magazines devoted to the subject of Entomology, it

has been thought desirable to collect and collate these valuable records for the use of our Coleopterists, present and future. This onerous task has been kindly undertaken on behalf of our Magazine by Mr. Donisthorpe, and the eight coloured plates in illustration, the drawings for which have been executed by Miss B. Hopkins of the Natural History Museum, are due to the generosity of one of our Editors. This series of papers will appear in our pages at frequent intervals, and when they are completed it is to be hoped that they will take their place in the literature of our British Coleoptera as being in large measure a 'Second Supplement' to the 'Coleoptera of the British Islands,' the *magnum opus* of one of the most highly-esteemed Editors of our Magazine.

CARABIDAE.

Nebria iberica Ol., Mel. Ent., 21 (1877) [Donisthorpe, Ent. Mo. Mag., **58**, 92 (1922)].

This species is very like the common *Nebria brevicollis* F., but differs from it chiefly by the fact that there are no fine hairs on the upper surface of the posterior tarsi. In *brevicollis*, even when these hairs have been rubbed off, the pores whence they spring are visible; whereas in *iberica* the upper surfaces of the posterior tarsi are absolutely bare.

The striae of the elytra are also said to be not so deep as in *brevicollis*, and according to Pasteur Huberthal (confirmed by Colonel Deville) in the male genitalia the penis is much more slender, less constricted at the base and less strongly curved inwards.

N. iberica is probably mixed with *N. brevicollis* in many of our collections.

Westerham, New Forest and Padworth (Donisthorpe); Borrowdale, Connemara and Mortehoe (H. E. Andrewes); Oxford, Woking, Chatham, Belfast, Rannoch and Ollaberry, Shetland (J. J. Walker); Isle of Man and Scilly Isles (Blair).

Badister dilatatus Chaud., Bull. Mosc., **3**, 20 (1837) [Joy, Ent. Mo. Mag., **63**, 279 (1927)]. (Plate A, fig. 1.)

This species comes nearest to *B. peltatus* Pz., and is, indeed, considered to be an aberration of that insect by Ganglbauer. Deville is of the opinion that *dilatatus* is a good species, and he says *peltatus* is narrower, more shining brassy and with paler legs. (*Cf.* Plate A, fig. 2.)

Joy states that *dilatatus* differs from *peltatus* in being without, or with only a slight, metallic reflection; the thorax broader

in proportion to the elytra; the latter less rounded at the sides and more abruptly contracted behind; the legs darker, and the length on the average slightly longer. He also considers the aedeagus to be quite different in the two species.

Tresco, Scilly Isles, April, 1908 (Joy); Killarney (Bullock).

Stenolophus teutonus Schr., ab. **abdominalis** Géné, Mem. Ac. Torin., 1836, 170 [Newbery, Ent. Mo. Mag., **53**, 129 (1917)].

In this aberration the abdomen is coloured red instead of being black. The late Canon Fowler recorded that he possessed an example from the Morea, and that the antennae were lighter and the black markings less defined in the type form.

Reitter does not record it from Germany.

The only definite British record appears to be that of four examples found under stones on the undercliff at Barton-on-Sea, Hants, by Dr. C. F. Selous in September, 1907.

Bradycellus distinctus Dj., Spec., **4**, 470 (1829) [Sharp, Ent. Mo. Mag., **49**, 54 (1913)]. (Plate A, fig. 3.)

The insect standing in our collections under the name of *Bradycellus distinctus* Dj., having proved not to be that species, Dr. Joy has renamed it *B. sharpi* [Ent. Mo. Mag., **48**, 257 (1912)].

Dr. Sharp, however, captured the true *B. distinctus* Dj., near Bournemouth, where he took three specimens in the summer of 1912. It has been since taken freely near Studland (Dr. Sharp and A. Ford). It is a very easily distinguished species, having a great deal of punctuation on the thorax, and well marked hind angles to the same. It has no pore on the third interstice of the wing-cases, but it possesses ample wings. It is the largest of our species, being slightly larger than *B. sharpi.*

Harpalus 4-punctatus Dj., ab. **montivagus** Reitt., Verh. Naturf. Ver. Brünn, **38** (1899), 79 (1900). [Janson, Ent. Mo. Mag., **56**, 14 (1920)].

In this aberration the legs are black, or dark piceous, instead of being red as in the typical form.

In July, 1919, the late O. E. Janson and L. H. Bonaparte-Wyse captured about a dozen specimens each of this aberration on the Sugar Loaf Mountain, County Wicklow.

It occurred under stones and at the roots of heather in company with the type-form.

Pterostichus angustatus Dufts., Fn. Austr., **2**, 162 (1812) [Tomlin, Ent. Mo. Mag., **52**, 158 (1916)]. (Plate A, fig. 4.)

This beetle is closely allied to *P. oblongo-punctatus* F., but is

on the average smaller, ranging in length from 7.5 to 10.5 millimeters, and differs from that species in that it is entirely shining black, except the tips of the palpi, the spines and bristles of the legs and the tarsal claws, which are all clear red; the form is shorter in proportion to the breadth; the thorax has broader margins, the elytra have three foveiform impressions on, or near, the third interstice instead of five, the impressions being much deeper and more obvious; the episterna of the metasternum are markedly narrower and punctuated, whereas in *P. oblongo-punctatus* they are broad and smooth. The last seven joints of the antennae are inclined to be pitchy. The elytral impressions are not always quite symmetrically placed, and occasionally there may be present three on one elytron and four on the other. The tarsal joints of the male are much less dilated than in *P. oblongo-punctatus.*

First taken in the spring of 1916 by Messrs. W. E. Sharp, Tomlin and others on burnt ground at Crowthorne, Berks. Westerham (P. Harwood); Woking, in plenty, May, 1917 (G. C. Champion). Windsor Forest (Donisthorpe).

Abax parallelus Dufts., Fn. Austr., **2**, 64 (1812) [Blair, Ent. Mo. Mag., **56**, 7 (1920)]. (Plate A, fig. 5).

This insect is smaller, narrower and less depressed than *A. ater* Vill. (the *A. striola* F., and British authors), and has more the appearance of *Pterostichus niger* or *P. vulgaris.* It is, however, a true *Abax* differing from *Pterostichus* in the absence of pores on the third interstice of the elytra, and in having the seventh interstice raised towards the shoulder. The claw-joint of tarsi is without bristles on the under side; the raised seventh interstice of elytra is convex towards the base, and the head possesses a single marginal sulcus at the sides between the eyes.

A single specimen was taken by W. N. Blair on the island of St. Mary's, Scilly, in July, 1913.

Amara ovata F., ab. **adamantina** Kol., Mel. Ent., I., **52** (1845) [Keys, Ent. Mo. Mag., **51**, 240 (1915)].

This aberration is of a brilliant metallic blue, instead of the usual brassy coloration of the type.

Keys records it first as British, at least by name, from a specimen taken at Whitsand Bay, near Plymouth, in March, 1902. Chatham, Abbotsbury and Dartmouth (Donisthorpe).

Anchomenus dahli Borre, Ann. Soc. Ent. Belg., 1879, 55 [Newbery, Ent. Mo. Mag., **50**, 105 (1914)].

According to the late E. A. Newbery the insect known to us as

Anchomenus atratus Pz. is not that species at all, but should be called *A. dahli* Borre. Also, although specimens from Cumberland, etc., are quite typical, the insect which occurs on the banks of the Thames between Putney and Kew is regarded by Colonel Deville as a variety.

This does not refer to *A. scitulus* Dj., which is found in river refuse after floods near Kew Bridge.

Tachys walkerianus Sharp, Ent. Mo. Mag., **49,** 125 (1913). **Tachys parvulus** Dej., Donisthorpe, Col. Brit. Isles, **6** (Supplement), 207 (1913). (Plate A, fig. 6.)

This little species is allied to *Tachys parvulus* Dj., but is more robust, less depressed, with a broader, more thansverse thorax, darker antennae, palpi and legs, and with more deep and strongly punctured striation of the elytra. According to Dr. Sharp the two species are extremely easy to distinguish, and the characters of *T. walkerianus* are almost invariable in a large series of specimens, except that when immature the legs and base of the antennae are a little lighter in colour. Dr. Sharp took it sparingly in the spring of 1912, and in some numbers in 1913, in wet moss beside a little stream in the New Forest, in company with *Actobius ytenensis, Chaetocnema arida,* etc. In this locality it has since occurred annually. In May, 1904, Donisthorpe found it not uncommonly in sphagnum bordering a swamp in another part of the New Forest in company with *Paederus caligatus,* etc., recording it later (l.c.) as *T. parvulus* Dj.

Tachys micros Fisch., Ent. Russ., III, 97 (1828) [Allen and Nicholson, Ent. Mo. Mag., **60,** 225 (1924)]. (Plate A, fig. 7.)

This species closely resembles *Tachys bistriatus* Duft. in structure and in general appearance, but differs from it in the following characters :—It is yellow in colour, with the exception of the head, which is of a more or less deep shade of fuscous, or quite black. The intermediate joints of the antennae are shorter than in *T. bistriatus,* and the posterior angles of the thorax are right angles and prominent, whereas they are rounded in the latter species. Length, 2 mm. This species was taken in considerable numbers on a patch of damp sand and mud near the coast not far from Charmouth, Dorset, by Messrs. J. W. Allen and G. W. Nicholson, in April, 1924.

Bembidion lampros Hbst., ab. **coeruleotinctum Reitt.,** Faun. Germ., **1,** 114 (1908). **Bembidium velox** var. **cyaneotinctum** Sharp, Ent. Mo. Mag., **49,** 135 (1913).

In this aberration the upper surface is bright blue. It appears

to be decidedly rare in Britain; Dr. Sharp recorded it from Brockenhurst.

The last-named author points out that *B. velox* Er. (which is considered to be a variety of *B. lampros* Hbst.) has, in addition to the extra row of punctures, the wings fully developed, whereas in *lampros* they are aborted.

Reitter gives *velox* Er. as a synonym of *properans* Stephens, but treats it as a variety of *lampros* Hbst.

Bembidion redtenbacheri K. Daniel, Münch. Kol. Zeits., **1,** 91 (1902-3) [Joy, Ent. Mo. Mag., **62,** 9 (1926)]. (Plate A, fig. 8.)

This species is very like a small example of *B. tibiale,* but is separated sharply by being more contracted behind, thus causing the elytra to be more decidedly pointed at the apex. Daniel says the elytra are always metallic, green with metallic lustre, sometimes blue-green, seldom steel-blue. Length, 4½—5½ mm. Three of Joy's specimens are black, and must thus be a melanic aberration.

Reitter considers *redtenbacheri* to be an aberration of *B. atrocoeruleum* Steph., of which he writes: 'This species, especially in the green form *a, redtenbacheri,* is smaller, but comes very near to *tibiale* Dufts.'

Joy compares *redtenbacheri* to *prasinum,* but that species comes in the sub-genus *Plataphus*—elytra with the striae equally deep to apex, whereas *redtenbacheri* belongs to the sub-genus *Peryphus*—at least the outer striae of the elytra are finer, or lost, towards the apex.

By the side of a small brook, near Sheffield (Joy).

HALIPLIDAE.

Haliplus confinis Steph. ab. **halberti** Bullock, Ent. Mo. Mag., **64,** 103 (1928). (Plate B, fig. 1.)

In this aberration the head and thorax are testaceous, the elytra black with a few very short narrow testaceous lines, and the reflexed margins of the elytra testaceous.

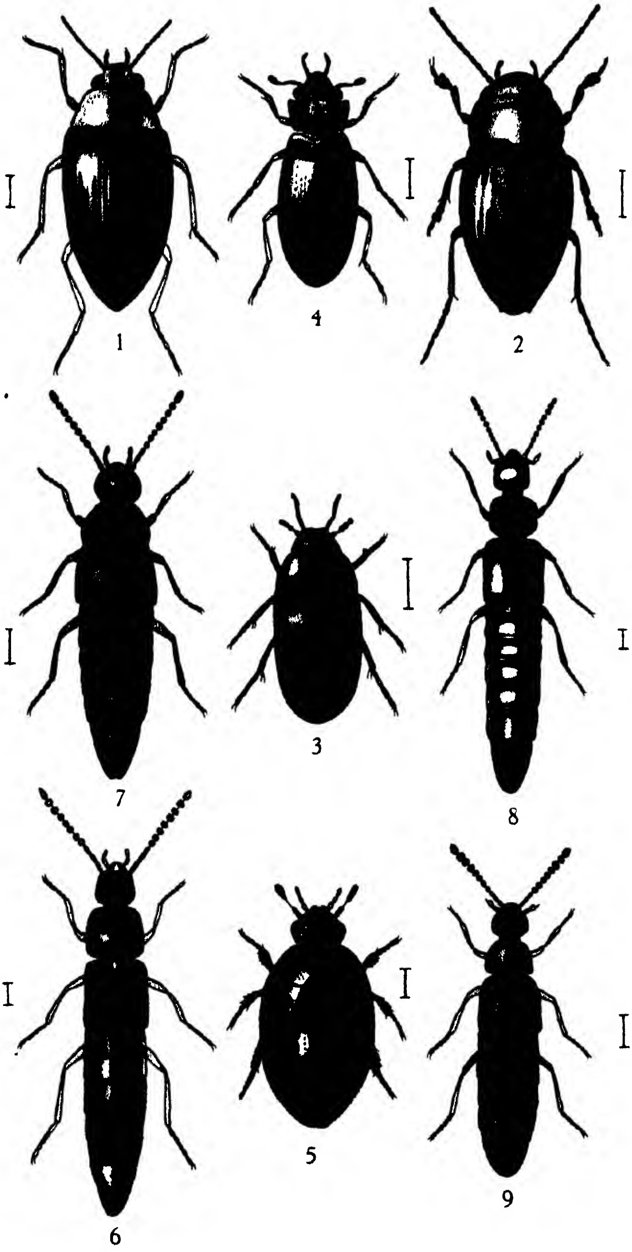
Taken in the clear water of the Lower Lake, Killarney, by Mr. Edwin Bullock.

Haliplus nomax B.-Browne var **brownei** Sharp.

Haliplus brownei Sharp, Ent. Mo. Mag., **49,** 75 (1913).

Short oval, testaceous, the black lines narrowed before the middle and sub-interrupted after it. Length, 2⅗ mm.

Male with the intermediate tarsi dilated, the basal joint at the apex abruptly thickened.



B. Hopkins del. P. J. Mulder & Son., Leiden, lith.

COLEOPTERA NEW TO THE BRITISH LIST
1913-1929.

Female less shining, with the tarsi scarcely dilated.

This species is extremely similar in coloration to *H. fluviatilis*, but it is of shorter form—*fluviatilis* being fully 3 mm. long—and is readily distinguished by this character, and by the peculiar middle feet of the male.

The latter character brings this variety nearer to *H. nomax* B.-Browne, in which species, however, the form is narrower, the elytra consequently straighter at the sides, and the black lines are entire and very strongly marked, and the profile of the male middle tarsus is a little broader, and the bending of the apical portion of its basal joint slightly less abrupt.

Taken plentifully, in company with *H. fluviatilis*, in the River Ouse at Stony Stratford by Dr. Sharp in September, 1868. Near Swindon, Wilts., and South Hinksey, Berks. (E. J. Pearce).

DYTISCIDAE.

Hydroporus (Deronectes) elegans Sturm, Ins. **9,** 35 (1835) [Balfour-Browne, Ann. Mag. Nat. Hist. (9), **3,** 293 (1919)]. (Plate B, fig. 2.)

This species is mixed in British collections under *H. depressus* F., to which it comes very close. As pointed out by Balfour-Browne, *elegans* is usually lighter in tone, with the black markings more limited. The sides of the thorax run more or less parallel, the greatest width being at some distance from the posterior angles. The curve in the claws is gentle and regular, being not so strongly bent as in *depressus,* and the two claws are more usually equal in length. The aedeagus is pointed, not broad, at the apex. Reitter separates *elegans* from *depressus* by the fact that the underside is entirely yellow-red, whereas in *depressus* it is entirely, or with the exception of the abdomen, black.

H. elegans is the commoner of the two; it is a river and loch species, being widely distributed in England and Scotland, but not being found in Ireland.

H. depressus is a northern and loch species; it occurs in the north of England, Scotland, and in Ireland

Rhantus exoletus Först. ab. **nigriventris** Newbery and Sharp, Ent. Mo. Mag., **51,** 288 (1915).

This aberration differs from the type-form by having the ventral abdominal segments black, or pitch-black.

It was taken in small numbers at Askham Bog, Yorks., by the late W. E. Sharp in March, 1895.

Wood Walton Fen, Hunts. (Donisthorpe, August, 1916).

GYRINIDAE.

Gyrinus natator Scop v. **oblitus** Sharp, Ent. Mo. Mag., **50,** 133 (1914).

Very near to *G. natator* but smaller, with the sculpture of the elytra less obsolete and the inner interstices subconvex towards the apex. Length, 5·5 mm.

The median lobe of the aedeagus is slightly narrower and its outline slightly more sinuous.

The type-specimen was found in the River Ouse at Stony Stratford in September, 1868, by Dr. Sharp.

Gyrinus edwardsi Sharp, Ent. Mo. Mag., **50,** 137 (1914), and **Gyrinus opacus** Sahlb., Ins. Fenn., **4,** 47 (1819) [**G. opacus** var. Sharp, Ent. Mo. Mag., **5,** 59 (1868)].

The name *G. edwardsi* is given by Dr. Sharp to the species known as *G. opacus* in British collections.

The true *G. opacus* of Sahlberg was taken by Dr. Sharp at Invercannich, Inverness-shire, in July, 1866, and recorded by him as a dull variety of *opacus.*

G. opacus, which is really an addition to the British List, can only be confounded with the most dull varieties of *edwardsi* and *marinus,* but it is more opaque than any of them, and when examined under a magnifying power of about 60 diameters it is seen that this dullness arises from the surface being very finely alutaceous. The claws of the middle and hind tarsi are pale yellow, although the apex of the tarsus is piceous. The male has the front tarsi broadly dilated, and the aedeagus is different from that of any other species of *Gyrinus.*

G. opacus inhabits rocky pools in company with *Deronectes griseostriatus.* Dr. Sharp captured the species again at Braemar in June, 1871, and June, 1909.

HYDROPHILIDAE.

Philydrus bicolor F. ab. **brevipalpis** Sharp, **P. maritimus** Th. var. **brevipalpis** Sharp, Ent. Mo. Mag., **50,** 83 (1914).

Much smaller than the usual form, and with the maxillary palpi so greatly reduced as to be sometimes only half the ordinary length. Taken with the type-form and varying in colour like it. Lymington, September, 1868 (Dr. Sharp); Southsea, April, 1912 (Pool).

Philydrus fuscipennis Th., Opusc. Entom., **10,** 1,031 (1884) [Sharp, Ent. Mo. Mag., **50,** 80 (1914)].

This species is very closely allied to *P. melanocephalus* Er., from which it differs in having the head and labrum in both sexes black, the sides of the former merely narrowly yellow-red in front of the eyes, and the terminal joint of the maxillary palpi black at the tip. The colour of the upper side is duller. The two species are probably mixed in British collections.

Dr. Sharp has taken it at Garelochhead on the Clyde, Morton, and Keir, Dumfries-shire, Rannoch, and New Forest. Padstow (Lamb).

Philydrus halophilus Bedel, Bull. Soc. Ent. France, 1878, 169 [Newbery, Ent. Mo. Mag., **50,** 79 (1914)].

Elytra with a series of setiferous pores. Head black, with a testaceous triangular spot in front of the eyes in both sexes, shallowly punctured and alutaceous behind the nearly straight transverse furrow, which is badly defined.

It occurs in brackish water. Morley captured it in a ditch on the coast near Bawdsey, Essex, in April, 1904.

Philydrus ytenensis Sharp, Ent. Mo. Mag., **51,** 323 (1915). (Plate B, fig. 3.)

Oval, moderately convex, closely and strongly punctured, elytra very finely and indistinctly punctured in rows; head black, the clypeus more or less broadly bordered with yellow; palpi yellow, black at the apex; thorax testaceous, more or less broadly infuscate on the disc; elytra pale, shoulder spots and external markings at the base black; beneath black, tibiae testaceous. Long, 5 mm.

This species is closely allied to *P. fuscipennis*, from which it differs by its pale elytra. It is readily distinguished from *halophilus* by the black tip of the palpi.

Taken in some numbers by Dr. Sharp in the New Forest.

Helophorus championi Sharp, Ent. Mo. Mag., **51,** 236 (1915) [**Helophorus strigifrons** Blackburn, Ent. Mo. Mag., **13,** 40 (1876)].

This species is distinguished by the broad form, robust build, and the fact that the flanks of the elytra are more broadly visible on the under surface than in any of the allied species. The palpi are rather short and stout, the terminal joint twice as long as the penultimate, slightly infuscate at the tip. The head is coarsely granulate, but the granules of the clypeus are much effaced, very dark in colour, the channel of vertex narrow, not broader in front. The thorax is very broad, strongly convex from front angle to front angle, the surface coarsely granulate, but the granules are more or less effaced on the convexity of the disc, the colour very dark, the surface made uneven by the convexity of the middles of the median and sub-median intervals; the median groove very narrow, sub-median groove also very narrow in front, but more or less broader behind, slightly sinuous, lateral margin faintly yellow in the middle; the front margin not sinuate behind the eyes, the sides somewhat convergent and straight behind. Sculpture of the elytra strong, the interstices broad and almost free from puncturation; seen from the side the lateral interstices are wide, and the external one very prominent, by which character the species is strongly separated

from *H. laticollis*; the legs are dark yellow inclining to brown, the hind femora are strongly punctured beneath. Length, 4½ mm.; breadth, 2 mm.

Guildford (Champion); Thornhill (Sharp). Killarney (Blackburn)?

Helophorus walkeri Sharp, Ent. Mo. Mag., **52**, 108 (1916).

Moderately elongate, antennae, palpi and legs yellow, thorax with the lateral margin more or less broadly yellowish; elytra profoundly and strongly punctured, depressed behind the middle, epipleurae red, not very narrow. Long, 3¼-4¼ mm.

Male with the aedeagus short and broad, pale.

Dr. Sharp remarks: 'An extremely variable species, not uncommon in England and Scotland, but mixed with others in our collections, especially with *aeneipennis*. It is so variable in the minor characters that it is almost useless to describe them; but it may roughly be divided into two forms, which I have in vain endeavoured to separate by any characters at all stable. First there is a shining form with a peculiar varnished appearance, having a metallic shimmer on the elytra, which appear dark in colour, the sculpture rather fine.

The second form is more flavescent in the colour of the elytra, which are also not so shining, and the sculpture of the thorax is usually very coarse, sometimes remarkably so.'

From the North of Scotland to the South of England. Sheppey (Walker); Epping (Pool); Woking, Guildford and Christchurch (Champion); Brockenhurst (Sharp), etc.

Helophorus phalleterus Sharp, Ent. Mo. Mag., **52**, 29 (1916).

Head and thorax black, sub-metallic, somewhat obsoletely sculptured, elytra fuscous, somewhat bronzed and shining, obsoletely impressed behind the middle, strongly punctate-striate, legs stout, dirty testaceous. Long, 3½ mm.

Dr. Sharp remarks: 'This insect presents us with a curious enigma. I should have passed it without any doubt as *aeneipennis*, but the aedeagus is markedly different, and does not agree with that of any other *Helophorus*. The legs are perhaps a little longer and stouter than in the similar forms of *aeneipennis*. I have only been able to find one specimen, but it is desirable to give it a name. The suspicion that will be entertained is that it may be a phallic sport or mutation of *aeneipennis*. Nothing of the sort has, so far as I know, been yet recorded, and if the creature be such a sport it opens a wide field for speculation. The colour on the under surface is very dark, and the elytra flanks are scarcely at all visible, in which it agrees with the corresponding variety of *aeneipennis*.'

Brockenhurst, one specimen, March 20th, 1915 (Sharp).

(*To be continued.*)

Editorial.

CHRYSOPHANUS DISPAR Haw., AND ITS RECENT ESTABLISHMENT IN THE BRITISH ISLANDS.

Plate VIII.

Through the courtesy of the Council of the Entomological Society of London, to whom our sincere thanks are due, we have the pleasure of presenting the readers of our Magazine with the beautiful coloured plate which accompanies the Report of the Committee of the Society for the Protection of British Lepidoptera (Proc. Ent. Soc., 1929, pp. 53-68). On this plate are depicted both sexes of the 'Glory of British Entomology' as the Lepidopterists of a long-past generation were wont to name our 'Large Copper' butterfly, as well as those European forms of *Chrysophanus dispar,* which correspond most nearly with this race as first described by Haworth more than a century ago, and which have in recent years been introduced into our Islands with a highly satisfactory measure of success up to the present.

For the history of the establishment of these flourishing colonies of this most exquisite butterfly we refer our readers to the above-mentioned Report, which deals with the discovery and extinction of our lost *C. dispar dispar,* and discusses in detail the characters which differentiate this race from the most nearly related Continental forms of the insect. Of these races, *C. dispar batavus* Obth., described under this name in 1923 from specimens found in Holland, approximates more closely in dimensions and details of markings to our own 'Large Copper,' as will be seen by the Plate, than any of the other known forms of the species. It was this form (which until recently was in imminent danger of extermination by over-collecting in its very limited localities, but is now fortunately under strict protection) that was selected by the Committee for the experiment of forming a colony of the butterfly in F[illegible]d. Under the auspices of the Society for the Promotion [illegible] Reserves, a highly promising locality for the purpose was fou[illegible]d in Wood Walton Fen, Hunts; and mainly owing to the strenuous efforts and unequalled experience of Capt. E. B. Purefoy, whose well-known and highly-successful colony of the 'Berlin form' of *C. dispar rutilus* in Southern Ireland has been in existence since 1914, an adequate supply of the race *batavus* was available for liberation in the summer of 1927. Much preparation of the site of the experiment, and extensive planting of the larval food in situations to suit the somewhat fastidious tastes of

the female butterfly in oviposition, had to be carried out, and a prolonged flood in the winter of 1927-8, when the Fen was under water for a period of sixty days, raised serious doubts as to the survival of the young larvae that had been observed in some numbers in the autumn. However, they came successfully through the ordeal, and in due course those Entomologists who were privileged to visit Wood Walton in July last year were gratified by the truly beautiful sight of the 'Large Copper' once more at home in an English fen, and in highly satisfactory numbers. The future success of the colony thus seemed to be assured, but unfortunately Hymenopterous and Dipterous parasites have found out the larvae, and the butterfly has been seen this summer in much smaller numbers than in 1928. Despite this unfortunate set-back, all Entomologists venture to hope that *C. dispar batavus* will, with due care and attention, attain at least as secure a footing in Wood Walton Fen as is the case with its near ally in Southern Ireland under the auspices of Capt. Purefoy, to whom a deep debt of gratitude is owing for his long-continued and successful exertions in this most interesting experiment.

HOMOLOGIES OF THE GENITALIA OF INSECTS.

BY HEM SINGH PRUTHI.

Entomologists have held very divergent views with regard to the morphology of the reproductive organs and the associated structures of insects. These organs can be roughly divided into two parts, namely (i) the internal reproductive organs, including the primary generative glands, ovaries and testes, and the ducts leading from them to the exterior, and (ii) the external organs which consist of a varying number of appendages found near or round the genital opening; these latter organs are generally known as the genitalia. I gave a brief account of the views about the homologies of the internal reproductive organs in 192[illegible]re, Vol. 115, p. 763), but did not deal with the genitalia, a[illegible]e it a about their homologies were at that time hardly unanimou[illegible] Since that date some papers on the subject have been publishe[illegible] which have considerably cleared the muddle. It has, therefore, been thought desirable to summarize the views about the nature of these organs as well.

In the adult female, the genitalia when fully developed consist of three pairs of appendages, termed the anterior, the posterior and the lateral ovipositor lobes. All the three pairs of lobes

constitute the ovipositor. The anterior lobes are borne by the eighth abdominal segment, while both the posterior and the lateral lobes are in association with the ninth.

In the adult male, the genitalia when fully developed consist of two pairs of appendages and a median copulatory organ, the aedeagus. Unlike those in the female, the genitalia in the male are borne by only one segment, the ninth. The male embryo bears a pair of appendages on the eighth segment as well, but these appendages disappear at an early stage of development except in some lower insects. The two pairs of appendages referred to above are known as the parameres and the subgenital plates. The parameres lie laterally to the aedeagus, and at their proximal ends are in close association with its base; the sub-genital plates are in continuation of the ninth sternum and lie under the aedeagus and the parameres.

In several groups of insects, however, there is in the male only one pair of appendages fully differentiated, the parameres (Coleoptera, Heteroptera, etc.) or the subgenital plates (Lepidoptera, some Diptera, etc.). This has caused a considerable amount of confusion, and till recently the impression prevailed that the male genitalia consist of one pair of appendages besides the aedeagus. The appendages, whether subgenital plates or the parameres, were given the same name 'claspers,' 'valves,' etc.; and hardly any investigator referred to the fact that the 'claspers' etc. of the different orders of insects are not homologous. In view of this confusion, no two workers agreed in reference to the homologies of the male genitalia with those of the female except in the point that in higher insects the appendages of the eighth segment of the male, the homologies of the anterior ovipositor lobes, disappear at an early stage of development.

In 1922, Kershaw and Muir (Ann. Ent. Soc. America, XV, *1922)* while studying the development of the genitalia in a Cercopid Homopteron observed for the first time that the male genitalia consist of two pairs of appendages exclusive of the aedeagus. Being still under the above-mentioned impression that the male has only one pair of appendages, they stated that the additional pair of appendages, the subgenital plates, were really the appendages of the eighth segment shifted on to the ninth during development, which, as stated above, disappear in most insects in the embryonic stage.

Kershaw and Muir's extraordinary results stimulated further research on the subject, and I studied the development of the

genitalia of a Jassid Homopteron (Quart. Journ. Micr. Soc., LXIX, 1925). I concluded that the subgenital plates do not migrate from the eighth to the ninth segment as Kershaw and Muir described, but are in association with the ninth from the very beginning.

Muir, however, was not convinced (Proc. Hawaiian Ent. Soc., 1926), and did not change his views about the nature of the subgenital plates. No further advance, therefore, could be made unless Muir's or my conclusions with regard to the nature of these important appendages were confirmed. George (Quart. Journ. Micr. Soc., LXXII, 1928), working on the same species on which Kershaw and Muir had worked, has shown that the subgenital plates are at no stage connected with the eighth segment, but are borne by the ninth even in very early instances.

There is no doubt, therefore, that the male genitalia when fully differentiated consist of aedeagus, a pair of parameres and a pair of subgenital plates, all borne by the ninth abdominal segment. To compare the genitalia in the two sexes, a few words may be said about their development. The three pairs of ovipositor lobes develop from two pairs of papillae present on the eighth and ninth segments of the young female. The papillae on the eighth segment develop into the anterior ovipositor lobes, while the pair on the ninth divides longtitudinally into two during development, which give rise to the posterior and lateral ovipositor lobes. The young male has also three pairs of papillae situated in the same position as the female, but the papillae of the eighth segment in this sex, as already mentioned, disappear at an early stage of development. Of the two pairs of papillae that persist, the lower outer pair develops into the subgenital plates which are thus comparable to the lateral ovipositor lobes; the upper, inner pair as the development proceeds, divides by longtitudinal fission into two pairs, an outer and an inner; the outer pair develops into the parameres, while the inner pair by fusion along the margins gives rise to the median copulatory organ, the aedeagus. It is evident, therefore, that both the parameres and the aedeagus are homologous to the posterior ovipositor lobes. George (*l.c.*) observed the aedeagus and the parameres as arising from a single pair of appendages; but he homologized the aedeagus only with the posterior ovipositor lobes, and was of opinion that the parameres were not of much morphological importance. This conclusion was hardly justifiable in view of his own account that these organs are present in most orders of insects and that they appear quite early in the phylogeny of

insects. Obviously George attached too much importance to the function rather than the morphological relationships of the organs, and being carried away by the important function of the aedeagus ignored the equally morphologically important organs, the parameres.

The above-described relationships of the genitalia in the two sexes can be expressed in a tabular form as follows :—

FEMALE.	MALE.
1. Anterior ovipositor lobes; on VIIIth abdominal segment.	Disappear at an early stage in development, except in some lower insects, like *Machilis*, etc.
2. Lateral ovipositor lobes; on IXth abdominal segment.	Subgenital plates.
3. Posterior ovipositor lobes; on IXth abdominal segment.	Aedeagus and Parameres.

Entomological Section,
Zoological Survey of India.
April 25th, 1929.

A NOTE ON THE SYNONYMY OF *STIGMODERA* (*THEMOGNATHA*) *FUSCA* SAUND. AND *PARVICOLLIS* SAUND.

BY K. G. BLAIR, B.SC., F.E.S.

The difficulties confronting the systematic entomologist are in any case manifold, and when far away from types his work is often completely held up from inability to determine with certainty the species of previous authors. To publish conclusions based upon inaccurately determined material necessarily only makes confusion worse confounded; yet a little time and trouble spent in securing accurate determination of the older species, by sending specimens for comparison with types not immediately available, would often well repay the delay and even possibility of loss involved.

One such case has recently arisen in regard to the Australian Buprestid beetles named above. H. J. Carter, in his 'Revision of the Genus *Stigmodera*' (Trans. Roy. Soc. S. Austral., XL, 1916, p. 86) gives the synonymy *S.* (*Themognatha*) *parryi* Hope (=*fusca* [illegible] =*parvicollis* Saund., =*major* Waterh., =*picea* Kerr.). The types of these, except that of *parryi* Hope which is at Oxford, are in the British Museum, and were presumably examined by Carter on his visit here in 1907.

In Arch. f. Naturgesch., 1922, Abt. A, p. 112, Dr. J. Oben-

berger describes as new *S. queenslandica,* placing it between *parryi* and *parvicollis,* which he declares are not synonymous.

In Proc. Linn. Soc. N.S. Wales, XLIX, 1924, p. 533, Carter considers *S. queenslandica* Ob. to be synonymous with *parryi* Hope, and in his recent 'Check List of the Australian Buprestidae' (Austral. Zool., v, 1929) adds *queenslandica* Ob. to the synonymy given in 1916, at the same time removing *major* Waterh. to *pubicollis* Waterh., which he retains as a distinct species.

Obenberger (Opusc. Buprest., I, 1928, p. 64) refutes this opinion, giving figures and arguments to prove the specific distinctness of the three forms *parryi* Hope, *parvicollis* Saund. and *queenslandica* Ob.

Having thus arrived at an 'impasse,' Mr. Carter has requested me to examine the types in the Museum and to publish independently my conclusions.

S. parryi Hope, Trans. Ent. Soc. Lond., IV, 1846, p. 210. The insect was received from Captain Parry 'from New Holland, but the exact locality is not known.' The type is at Oxford, but Saunders had examples of both sexes also from Capt. Parry, and the ♀ of these is ticketed 'Parryi H. ex. with type.'

Unfortunately on p. 103 of the same volume Hope had already given the name '*Stigmodera parryi*' to quite a different insect, an insect that on p. 213 of the same volume he described again as *S. saundersii* and which was subsequently removed from *Stigmodera* to the genus *Nascio.* Nevertheless the name *Stigmodera parryi* Hope (p. 210), being an absolute homonym, is invalidated, and in his 'Catalogus Buprestidarum,' 1871, Saunders substituted for it the name *fusca.* This name, therefore, must be used instead of *S. parryi* Hope.

As regards *parvicollis* Saund., this is certainly a distinct species, correctly recognised and differentiated from *parryi* Hope by Obenberger (1928, l.c.), and, further, with very different sculpture. The type of *S. picea* Kerr. is but a ♀ of *parvicollis* Saund.

In Trans. Ent. Soc. Lond., 1874, p. 539, C. O. Waterhouse described *S. pubicollis* and a var. *major,* closely allied to *fusca* Saund. (*parryi* Hope), differing from it mainly in its broader form and in colour. In sculpture the two forms are practically identical, that of the thorax being of a rather peculiar type, consisting of moderately fine punctures grouped together very irregularly, leaving intermediate smooth impunctate areas. In the ♂ the densely punctate areas, clothed with long hairs, tend to predominate, leaving irregular vermiculate smooth elevations between them, while in the ♀ the smooth areas tend to predominate until

in the median portion of the disc the punctures may be almost single and isolated. In both forms considerable variability is exhibited not only in density of puncturation but also in the shape of the thorax, the ♀ generally having the posterior angles more prominent laterally beyond the base of the elytra, a feature strongly insisted upon by Obenberger as a specific character for *queenslandica.* The figures given of this species would indeed fit very well the ♀ of *pubicollis* Waterh. (*i.e.* var. *major* Waterh.), the only difference appearing to be in colour, *queenslandica* being uniformly reddish brown, *i.e.* the colour of *fusca* Saund., while *pubicollis* has the thorax blackish aeneous and the elytra dark reddish-piceous, both with a narrow red border. As regards habitat, N. Queensland is certainly rather beyond the range of *fusca* or *pubicollis* as known to me, *i.e.* W. Australia, Albany, Swan River, etc., for both forms, while v. *major* is from N.W. Australia, but from here to N. Queensland is by no means an improbable extension. Indeed I have little hesitation in considering *queenslandica* from description to be a colour form, perhaps a local race, of *pubicollis* Waterh., while the latter though distinct from typical *fusca* Saund. is so close that it is doubtful whether the distinction can have full specific value. This, however, is more or less a matter of personal opinion, and my own inclination is to regard them as subspecies rather than species.

One other name is involved in the same complex, viz., *S. lateritia* Thoms. This is placed by Kerremans (Wytsman's Gen. Insect., Fasc. 12, 1903) and by Carter as a synonym of *pubicollis* Waterh. To Monsieur A. Théry I am indebted for the loan of Thomson's type, and can unhesitatingly confirm this synonymy. The type of *lateritia* is a little aberrant in having the red colour of the sides of the thorax scarcely indicated, but in other respects agrees perfectly.

The synonymy of these various names would appear then to be as follows :—

1. *S. fusca* Saund. (1871) nom. nov. for *parryi* Hope (1846, p. 210, nec. p. 103).

1A. (subsp.) *pubicollis* Waterh. (1874);
lateritia Thoms. (1879);
♀ *major* Waterh. (1874);
var. *queenslandica* Ob. (1922).

2. *S. parvicollis* Saund. (1869);
♀ *picea* Kerr. (1890).

British Museum (Natural History).
August 1st, 1929.

CHEMIOTAXIS AND *APHODIUS PRODROMUS* Brahm.

BY H. G. H. KEARNS, F.E.S.

In early April, 1929, at Cheddar, during a field investigation by Dr. C. L. Walton and the writer on the bionomics of Carabid beetles attacking strawberry fruit, attention was drawn to an interesting collection of beetles.

A number of pots had been placed by the growers in the strawberry beds to trap wandering beetles, and during a sunny afternoon one of them noticed a large number of beetles flying into one of the pots; the beetles came from all directions, and one by one went into the pot.

The following day a visit was made to Cheddar, and the pot examined to ascertain the species and the possible reason for the attraction of the beetles, a decomposing mouse being suspected. A careful examination of the contents of the pot disclosed the attracted beetles to be 134 specimens of *Aphodius prodromus*, of which about two-thirds had died in a decomposing mass of Carabid beetles, the majority being *Pterostichus vulgaris* L.

The odour was considerable, but the characteristic odour of the fluid of the pygidial glands was dominant. (This odour is evident if a collection of Carabid beetles is kept in a closed tin and then suddenly disturbed, when the odour arises.)

An examination of the immediate neighbourhood was made; it was found that two months previously dung had been spread on the field prior to setting potatoes. An explanation was then thought to have been found for the presence of the beetles, namely, the distribution of pupae with the dung. However, in spite of an extensive search of the soil, not one specimen of *A. prodromus* was found, only several *Aphodius fimetarius* L. A more extended search was then made, and fields were examined one by one with a negative result as far as *A. prodromus* was concerned. In a heap of short dung about a half-mile from the pot, a large number of adult *A. fimetarius* were found (they were confined to the outer 6 in. of the heap; deeper than that the heat was considerable).

On the top of the hill in direct line with the pot, about ¾ mile away, *A. prodromus* was found in numbers in the soil, and it is possible that this was one of the sources from which the beetles were attracted. It appears that the decomposing Carabids formed a most efficient attractant for *A. prodromus* (male and female) but of no value for *A. fimetarius*, although there were plenty of specimens in the immediate vicinity. Only the one pot acted as

an attractant; all the others were clean or only contained one or two living Carabids.

It is hoped to arrange an experiment next year and see if it be possible to repeat the above attraction and determine what it may be.

The University, Bristol.
July 29th, 1929.

THE SWARMING OF *CHLOROPISCA CIRCUMDATA* MEIGEN.

BY H. G. H. KEARNS, F.E.S.

It may be of interest to record some observations on this fly, as apparently little is known of the life history.

A number of the adults were observed in September, 1928, in various localities in Bristol, particularly in the vicinity of allotments; they were observed during an investigation on the parasites of the Gout-Fly of Barley (another member of the Oscinidae).

In mid-October large swarms of flies were reported by the Medical Officer of Health to be infesting two houses in Bristol. On examination they were found to be *Chloropisca circumdata,* which showed a marked preference to rest on the ceilings near windows facing South or South-West; along with them a few Chalcids were noticed. They had swarmed in such large numbers that the faeces had damaged the paper ceilings. Grasses and flower heads etc. were examined in the neighbourhood and also the vegetation on a number of allotments on the side of a hill, at the top of which one infested house was situated. However, no signs of larvae or puparia were found.

The swarming continued for about two weeks, and during this period the house was freed of these flies by fumigation and using a vacuum cleaner on them, but within a day or so a fresh infestation had occurred. Another house a few hundred yards away had a small swarm, but these quickly dispersed at the time the swarm at the other house was on the increase. The weather was mild and humid; frosts did not occur until later in the year.

At the end of the month the flight into the house ceased, and about this time the majority of them were killed by the vacuum cleaner etc., and no further infestation was observed. A few flies that had escaped the cleaning operations were seen about the house until early in 1929; after that date they gradually disappeared, but whether by flight or death is uncertain, but it seems

improbable that flies would leave the warmth of a house at this time of the year, more especially in view of the severe weather.

As soon as the swarm appeared, Dr. C. G. Lamb was informed, who kindly confirmed the identification and also gave details of a small swarm in Cambridge that occurred about the same time, and he requested to have the details recorded. The swarm suddenly appeared in a house in Cambridge in early October, but disappeared within a few days. Dr. Lamb mentions that the flies have a preference for warm places, and also the swarming habit is not unusual among the Oscinidae, but the reason for the swarming is not known.

The questions arise : do the flies oviposit in autumn, producing a winter generation of larvae and adults in the spring, or do some hibernate over winter and oviposit in spring?

A count of the proportion of the sexes showed two males to every female. A number of females were dissected, but although the ovaries were well developed no ripe eggs were found.

In the case of the Gout-Fly of Barley (*Chlorops taeniopus* Meig.) the females oviposit in September in couch-grass, producing a winter generation of larvae which appear as adults in April; this generation also oviposits in the same plants.

The presence of the Chalcid is interesting, as in the Gout-Fly there is a Chalcid endoparasite which follows the phases of the host's life history, so perhaps the Chalcids noticed are parasites of *C. circumdata* performing the same habit.

Reference.

Frew, J. G. H. On *Chlorops taeniopus* Meig. (the Gout-Fly of Barley) Ann. Applied Biology, Vol. 9, No. 2, July, 1924.

The University, Bristol.
July 29th, 1929.

NOTE ON PLUM LEAF-HOPPERS.

BY A. M. MASSEE, F.E.S.

During the first week of May, 1928, numbers of small creamy-white insects were seen to emerge from the trunks and main branches of some ten year old plum trees, growing on one of the experimental plots at East Malling. In the field, it was considered that the insect was a species of Capsid, but upon closer examination in the laboratory it was found to be a Jassid.

Complete details of hatching were not obtained, but in several instances the leaf-hoppers were observed to be partly extruded

from the trunks, and they remained immobile in that position for a period of two days. During this time the nymphs remained quite rigid with the appendages pressed tightly against the body and the bright red eyes standing out very conspicuously. When the nymphs finally freed themselves from the egg cases, they remained upon the shoots for some hours before commencing to feed upon the leaves. The leaf-hoppers were first noticed hatching on May 5th, 1928, and they continued to hatch until May 21st.

Further observations were made during September and October, 1928, but it was not until the second week in October that the leaf-hoppers were actually observed depositing their eggs in the trunks and branches of the plum trees. Oviposition continued until the end of October.

The plum trees were examined again during the spring of 1929, and leaf-hoppers were seen to emerge on May 18th. The leaf-hoppers continued to hatch until June 5th, which appeared to be the last date of hatching this year. Some of the leaf-hoppers were collected and placed in muslin bags, which were 'sleeved' around plum shoots growing naturally in the plantation. When mature, they were removed from the muslin bags, and were forwarded for identification to Mr. G. A. W. Duffield, of the South Eastern Agricultural College, Wye.

Mr. Duffield informs me that two species of leaf-hoppers were present in the material sent to Wye. The species in question being *Typhlocyba quercus* Fab. and *Zygina coryli* Collin. *Z. coryli* is the commoner species at East Malling, and in a dry summer it may cause considerable damage to some varieties of plum trees, and must be considered a pest of economic importance. 'Myrobolan' or 'Cherry Plum' (*Prunus cerasifera* Ehr.) appeared to be attacked more severely than any other variety.

It is of interest to note that the plum trees upon which the main hatching was observed were sprayed with a tar-distillate wash during January, 1928. The spray was applied at the strength of 7½%. It would appear, therefore, that the tar-distillate wash, applied in the dormant season, did not destroy the eggs of the leaf-hoppers which had been laid upon the trees during the previous October.

The writer is indebted to Mr. G. A. W. Duffield for the identification of the two species of Jassids.

East Malling Research Station.

August 1st, 1929.

TRICHOPTERA, EPHEMEROPTERA, PLECOPTERA AND NEUROPTERA OF BRECONSHIRE.

BY MARTIN E. MOSELY, F.E.S.

The recent drought having rendered fishing prospects poor, I devoted a week early last June to the Entomology of the River Usk and its side streams, and left the trout more or less to themselves. The groups comprised in the heading were well represented in the neighbourhood, particularly Trichoptera, and it appears desirable to place on record the results of this brief expedition. The collections were all made within a few miles' radius of Talybont-on-Usk between the 7th and 12th June, 1929.

TRICHOPTERA :—*Phryganea grandis* L., taken on the canal; *Colpotaulius incisus* Curt., Lake Llangorse; *Glyphotaelius pellucidus* Retz, canal; *Limnophilus flavicornis* Fab., Lake Llangorse; *L. centralis* Curt., *L. hirsutus* Pict., and *Drusus annulatus* Steph., small side streams of the Usk; *Ecclisopteryx guttulata* Pict., *Sericostoma personatum* Spence, *Crunoecia irrorata* Curt., *Lasiocephala basalis* Kol., *Leptocerus nigronervosus* Retz., and *Leptocerus annulicornis* Steph., more or less plentiful on the Usk; *L. aterrimus* Steph., both black and brown forms plentiful on Lake Llangorse; *Mystacides azurea* L., taken on the canal; *M. longicornis* L., common, and *Triaenodes bicolor* Curt., one example only, taken on Lake Llangorse; *Adicella filicornis* Pict., in swampy places on side streams; *Molanna angustata* Curt., on Lake Llangorse; *Beraea pullata* Curt., in swampy places on side streams; *Hydropsyche pellucidula* Curt., on the Usk; *Diplectronia felix* McLach., in a brook running through a wood; *Plectrocnemia conspersa* Curt., *P. geniculata* McLach., and *Polycentropus flavomaculatus* Pict., on the Usk; *Holocentropus dubius* Ramb., *H. picicornis* Steph., and *Cyrnus trimaculatus* Curt., on Lake Llangorse; *Tinodes waeneri* L., on the canal; *T. assimilis* McLach., on side stream at a waterfall; *Lype phaeopa* Steph. and *Philopotamus montanus* Don., on side streams; *Wormaldia occipitalis* Pict., on small brooks; *Rhyacophila dorsalis* Curt., on the Usk and side streams; *Glossosoma boltoni* Curt., on side streams; *G. vernale* Pict., *Agapetus fuscipes* Curt., and *A. comatus* Pict., on the Usk; *Agraylea multipunctata* Curt., on Lake Llangorse; *Hydroptila sparsa* Curt. and *H. forcipata* Eaton, on the Usk; *H. pulchricornis* Pict. and *Oxyethira costalis* Curt., on Lake Llangorse.

EPHEMEROPTERA :—*Ephemera danica* L., *Baëtis binoculatus* L., and *B. pumilus* Burm., on the Usk; *Rhithrogena semicolorata* Curt., on side streams; *Cloeon* sp., on Lake Llangorse; *Ecdyurus venosus* Fab., on the Usk; *E. lateralis* Curt., on side streams.

PLECOPTERA :—*Nemoura cinerea* Oliv., *N. marginata* Pict., *N. meyeri* Pict., *N. inconspicua* Mort., and *N. variegata* Oliv.; *Leuctra nigra* Pict., *L. inermis* Kempny, and *L. hippopus* Kempny; *Chloroperla grammatica* Scop., *Isopteryx torrentium* Pict.

ODONATA :—*Agrion pulchellum* Van der Linden, Lake Llangorse.

I had no facilities for collecting Odonata, and took merely the one example as it seemed as special interest.

NEUROPTERA :—*Boriomyia subnebulosa* Steph., *Hemerobus humuli* L., *H. lutescens* F., *Micromus paganus* L., *Chrysopa perla* L., *Panorpa germanica* F., *Sisyra fuscata* L.

43 Lansdowne Crescent, W.11.
August 5th, 1929.

Aphodius lividus Ol. at St. Helena.—During the voyage to Cape Town to attend the meetings of the British Association for the advancement of Science in South Africa, we had the good fortune to be able to spend a morning on the island of St. Helena. Most of the time was taken up by a drive to Longwood, which stands at an elevation of 1,736 feet above sea level, and I had therefore very little time to hunt for beetles. On the road in Jamestown itself a specimen of the above *Aphodius* was found in donkey-droppings. This appears to be one of the most widely distributed species of the genus. The only other beetle observed was an African species of *Coccinella*. Earlier in the voyage, we went ashore at Teneriffe, but everything was so parched by drought that beetle-hunting produced nothing; a few butterflies were seen, including one or two specimens of the 'Clouded Yellow' *Colias croceus* (*edusa*). We also called at Ascension, but were not allowed to land.—T. Hudson Beare, Cape Town, July 18th, 1929.

[This little Lamellicorn is now practically cosmopolitan, and has reached some of the most remote oceanic islands, doubtless through the agency of commerce. Wollaston, in his monographs of the Coleoptera of the Atlantic Islands, records the beetle from Madeira, the Canaries, and the Cape Verdes, as well as from St. Helena; and it was taken in the Azores (Terceira and Fayal) by Mr. Godman's collector. It is also recorded from the Hawaiian Islands, and more recently from Samoa and Tonga. *A. lividus* has been met with by me in practically every Mediterranean and Australian locality in which I have collected, including New Caledonia and the New Hebrides; but I never saw nor heard of it during my prolonged visit to New Zealand, and it is not included by G. M. Thomson (The Naturalisation of Animals and Plants in New Zealand, 1922) among the Coleoptera introduced into those islands, though the equally cosmopolitan *A. granarius* L. is there fully established and abundant. *A. lividus* is by no means a common species in Britain, and in my long experience of collecting at home I have met with it on three occasions only—at Holy Island, 1873, Stockbury, Kent, 1886, and Kidlington, Oxon, 1912—in each case as single examples on the wing or by casual sweeping in early autumn.—J.J.W.]

Phaedon tumidulus Germ. (Col.) as a pest on celery (Apium graveolens).—I can find no reference to the occurrence of this beetle on celery, and, as far as my own experience up to the present has been concerned, it occurs exclusively on Hogweed (*Heracleum Sphondylium*). A market-gardener in Scarborough has, however, just reported it to me as doing extensive damage to celery. The whole of one double row of plants, twenty-five yards in length, has been completely destroyed, and infestation has commenced at the ends of about ten other rows. The beetles are in enormous numbers; a tube brought to me contained 128 specimens, shaken from one small plant, from which a number had already dropped. The outer leaves were first eaten, then the 'heart,' and finally the stalks. So complete has been the destruction that the whole of the row has had to be replanted.—Geo. B. Walsh, Stepney Drive, Scarborough: *July 30th*, 1929.

(At Oxford, where *P. tumidulus* is by far the most abundant member of its genus, it exhibits a decided preference for the Cow Parsley (*Anthriscus sylvestris*), though it is found freely enough on *Heracleum* and other ordinary Umbelliferae.—J.J.W.)

Calocoris norvegicus Gmel. (bipunctatus F.) on Mullein (Verbascum).—Some mullein plants (*Verbascum libani*) growing in a garden at East Malling failed to flower this year, although the spikes were abundantly furnished with flower-

buds. Examination showed that the Capsid *Calocoris norvegicus* was responsible. Scores of adults of this bug swarmed on the spikes during the latter half of July, and by their sucking prevented the flower-buds from opening. Large drops of black fluid oozed from their feeding punctures, and brown marks were also made on the stems, the total effect giving the plants a most unsightly appearance.

The failure of the flowers to open, whilst an isolated plant in another situation came into flower normally, was the first sign that anything was amiss. The owner of the garden at first attributed this to the fact that the plant which flowered was in a more sheltered position, and did not notice the Capsid markings till about the middle of July.

Many of the bugs had probably come in the first place from eggs laid in an adjacent fence, and had found their way to various plants on which to feed and mature. Some, no doubt, had flown into the garden in the adult state.

The damage to the mullein appeared to have been caused largely by adult insects, which showed a decided preference for this plant over the other plants of the garden. These included carnations and Indian pinks (Caryophyllaceae), Delphiniums (Ranunculaceae), candytuft and stocks (Cruciferae), Dielytra (Fumariaceae), Chrysanthemums, marigolds and asters (Compositae), a few Pentstemons (Scrophulariaceae), various roses and potatoes.

The preference shown for Mullein is of interest inasmuch as Butler (Hemipt.-Heteropt. Brit. Isles, p. 397) draws attention to the entire lack of records of *C. norvegicus* from plants of the order Scrophulariaceae.

The leaves of some Chrysanthemum plants next to the mullein bore typical Capsid punctures, but these may have been caused by *Lygus lucorum*, which was abundant on the Chrysanthemums, only a few *C. norvegicus* occurring with them. None of the other plants appeared to have been damaged except the potatoes. Some nymphs and a few adults were present on the potatoes when examined at the end of July, but most of the adults appeared to have forsaken the potatoes, of which they are normally very fond, in favour of the mullein.—W. Steer, East Malling Research Station, Kent: *August 6th*, 1929.

Review.

'The Social Insects: their Origin and Evolution.' By Professor William Morton Wheeler. London: Kegan Paul, Trench, Trubner & Co., 1928. Pp. i-xviii, 1-378, 79 figures. Price 21/-.

The twelve lectures composing this volume were delivered in Paris in 1925 and published in French in 1926, but in this English edition the work has been brought up to date. In an earlier book of rather similar title, 'Social Life among the Insects' (1923), the author stressed the fundamental rôle of nutrition in the development of insect societies, while the volume under review is largely concerned with other aspects of the subject. It is attempted to answer at least partially four questions: (i) What are the social insects? (ii) Can they be shown to have had an evolution? (iii) If so, what are its peculiarities? and (iv) To what general causes may it be assigned?

To answer the first, we must distinguish 'societies' from mere 'associations,' aggregations of organisms brought about by extraneous factors, some of them merely temporary, as, for example, a chance assemblage of Coleoptera in flood-rubbish. In them each single individual is oriented primarily towards stimuli emanating from its environment and not from the other individuals of its species. In a true society the stimuli come primarily from the other individuals,

and orientation towards the outside environment is secondary. Also it should be grasped that neither an associative nor a truly social mode of life is exceptional or in need of a special explanation, as was long assumed by older schools of biologists, but is a normal and almost universal fact. All animals at some period of their lives form part of some association or society, and a special explanation might more properly be required for the truly solitary mode of existence.

On the evolution of social insects Professor Wheeler brings to bear a wealth of information drawn from a number of sources, the palaeontological record, the comparative morphology of existing insects, the accumulated data of taxonomy and geographical distribution, and the comparative behaviour (ethology) of living forms. The social insects are believed to have had a very long evolution, the peculiarities of which are discussed in these lectures. Before going further we may note one point under question (iv), concerning the general causes assignable to this evolution, namely that without doubt 'the effects of social activities have become hereditary.' Permanent social living has created a new environment, continuous response to which throughout milleniums has produced new characters, modifying and sometimes masking the original structure and habits of pre-social ancestral forms. These new morphological, physiological and behaviouristic features have 'acquired some kind of representation in the germ-plasm.' Wheeler is, therefore, perhaps not entirely at one with Bugnion, who (in his essay on 'The Origin of Instinct,' reviewed in our July number, p. 161) maintains, in a sense opposed to Weismann's germ-plasm hypothesis, that newly-acquired instincts are inherited. The distinction is perhaps rather an academic one. It is enough here to stress that both Wheeler and Bugnion are convinced that the social medium has induced the appearance of new characters, and that these have been transmitted to subsequent generations.

The first lecture contains a list of social and subsocial insects, comprising representatives of six families of Coleoptera, eighteen groups of Hymenoptera and sections of six other Orders, or thirty groups in all, twelve of which have become definitively social. Still other cases, which grade imperceptibly into the 'infrasocial' forms, are excluded from this enumeration. A brief account is given of some selected representatives of the 'subsocial' Coleoptera, which were more fully treated in 'Social Life among the Insects,' and the remainder of the book is restricted to a discussion of the evolution of the Isoptera (termites) and the social Hymenoptera, and more general matters. Separate lectures are devoted to the Origin of Hymenoptera Terebrantia and Aculeata, to the Evolution of (respectively) Wasps, Bees, Ants and Termites, to Polymorphism, the Social Medium, and the Evolution of the Guests and Parasites, both solitary and social. There is a lengthy bibliography and index.

The termites are traced back to Protoblattoid ancestors, existing perhaps as early as Permian times. They passed through stages resembling the simpler living termites and have culminated in the specialised and exuberant tropical termite-faunas now in being. The direction of their evolution has been mainly determined by the peculiar character of their food, a diet of cellulose and humus, which is held responsible for many of their most striking peculiarities, among them the employment of symbiotic Protozoa in the intestine to aid in digestion of cellulose.

The evolution of the social Hymenoptera has been much more diversified. That of Hymenoptera in general began with forms like the Permian Protohymenoptera, related to our modern Mecoptera (scorpion-flies), which led to the Phytophaga. Some of this vegetarian group became (like the still living Oryssidae) entomophagous 'parasitoids,' and opened the way for the appearance of

the Terebrantia or 'Parasitica,' all but a few sections of which have remained entomophagous to the present day. The Terebrantia gave rise to, *inter alia*, the Bethyloidea, a group consisting to-day of small archaic forms. Unknown primitive Bethyloids were the forerunners of the social Aculeates, and it is very remarkable that some existing members of the Bethyloid section exhibit that prolongation of the life of the mother and the intimate relations between parent and offspring, the establishment of which was surely a big step forward in the development of social habits. Thus, the female *Scleroderma* first paralyses and then lays eggs on a Cerambycid larva; she remains with and tends her larvae while they feed externally on the prey, and she may live to see her adult offspring of the first and second generations. The Bethyloids thus foreshadow the social Aculeates in behaviour as well as in structure. Primitive Vespoids and Sphecoids have practically the same habits as Bethyloids, but some groups became partly or entirely anthophilous (eaters of honey and pollen). This may have occurred with the increase of flowering plants in the Cretaceous period, and paved the way for the genesis of the bees.

Perhaps there is no more striking instance in the whole animal kingdom of parallel or convergent development, for essentially the same type of social organisation has been attained independently by at least a dozen different groups. Even a family like the Apidae is regarded as having had a polyphyletic origin, suggestive of a concealed parallelism of development, due to adoption of anthophilous habits by only distantly related wasp-like ancestral groups. A further polyphyletic evolution is exhibited by the various 'cuckoo-bees' now existing, which are believed to have originated separately from the various genera, or even species, which they severally parasitise.

Ants, having arisen from Vespoid (Tiphiid and Scoliid) ancestors, are still mostly entomophagous, though many genera have become increasingly vegetarian. Students specially interested in the closely interrelated palaeontological and zoogeographical aspects of the subject find food for reflection in the suggestion that the ants originated in the dry interiors of the Mesozoic continents, in geological periods of great heat and aridity. The distribution and habits of existing ants point to the group as a whole being originally markedly xerophilous and terricolous, while only some sections have secondarily adapted themselves to humid conditions or an arboreal life.

The author attaches great significance in the social evolution to the conception which he has designated 'trophallaxis,' literally 'exchange of food.' The feeding of brood by adults, or of one adult by another, is often not a one-sided act. Something is given in return, though not necessarily food of the same kind or nutritive value. The simplest case is that of wasp-maggots (*Vespa* and *Polistes*), which, after being fed by the workers, secrete from the salivary glands a liquid greedily swallowed by their nurses. It is possible to trace a series of phenomena of increasing complexity, culminating in the extraordinary relationships between ants and their 'symphile' guests and parasites.

Lastly, Professor Wheeler tries to forecast the future of the social insects in a world where the balance of wild floras and faunas is being rapidly disturbed by a 'much younger and more powerful social animal—man.' The several manifestations of social life have been arrested at different stages in their phylogeny, largely owing to the stabilisation of environmental conditions. The formation of new varieties and subspecies which may still be proceeding to-day is but a feeble oscillation, involving no essential deviation from the existing types of society. There may be some further 'involutionary' tendency, *i.e.* simplification of the characters of the individual in response to the social medium, a regressive

process which is shown to have already occurred in some measure. But when the exquisite natural balance of the wild flora and fauna is upset by human operations, extermination is the ultimate fate forecasted for all forms except those preserved by man for his own benefit. It is indisputable that this happens to a great extent, and largely through indirect agency, such as the attacks of aggressive species like the Argentine Ant, which follow in the track of civilisation. For enthusiastic naturalists the prospect is gloomy, but no disparagement of Professor Wheeler's powerful writings is intended if we remark on the obvious difficulty of foretelling the future, and that unforeseen circumstances may intervene to modify the course of events apparently hastening towards an inevitable conclusion.—H.S.

NOTES ON THE FAMILY CHIRONOMIDAE, SUBFAMILY TANYPINAE (DIPTERA).

BY JOHN R. DIBB.

The genus *Pelopia* was erected by Meigen in 1880, but he afterwards substituted the name *Tanypus* (1803), with *monilis* L. as type. In 1889 *Tanypus* was divided by Skuse into two new genera —*Procladius* for species with bare wings and petiolate cubitus, and *Isoplastus* for species with hairy wings and sessile cubitus. Skuse places in the genus *Tanypus* species with bare wings, sessile cubital veins and forked R_2+_3.

According to Johannsen the type is *punctipennis* Meig.; in this case *Tanypus* should embrace the species with petiolate cubitus, and he raises a new genus *Ablabesmyia* for the species with hairy wings and a sessile cubitus.

Later (1907) a new genus *Protenthes* was erected by Johannsen for *punctipennis* Meig., and Kieffer (1906) created the genus *Trichotanypus* for species with hairy wings and a long-petiolate cubitus.

The following table serves to distinguish the genera in which British species have been recorded.

TABLE OF GENERA.

1. T_2 inserted on Cu_1 2
   T_2 inserted on petiole of cubitus 3
2. Wings hairy; pulvilli large .... **Psectrotanypus** Kieff.
3. Fourth tarsal segment cordiform and much shorter than fifth
   .... **Clinotanypus** Kieff.
   Fourth tarsal segment cylindrical and as long as fifth 4
4. Cubitus petiolate; wings bare .... **Procladius** Skuse.
   Wings hairy 5
5. Terminal segment of hypopygium bilobed; petiole of cubitus almost
   as long as Cu_2 .... **Trichotanypus** Kieff.
   Terminal segments of hypopygium nearly cylindrical; petiole of
   cubitus much shorter than Cu_2 .... **Protenthes** Joh.

6. Costa not or scarcely produced; antennae of ♀ with twelve to thirteen segments .... **Tanypus** Meig.
   Costa distinctly produced; antennae of ♀ with fifteen segments .... **Macropelopia** Thein.

The foregoing genera are in turn briefly described together with tables differentiating the British species.

Genus **Psectrotanypus** Kieffer 1909.

General Characters.—Wings hairy; T_2 inserted on Cu_1; R_2+_3 forked; pulvilli long and broad; antennae of ♂ usually of fifteen segments, rarely thirteen segments.

TABLE OF SPECIES.

1. Wings more or less darkened in patches 3
   Wings not darkened 2
2. Wings long and comparatively narrow, almost reaching tip of abdomen; fore tibia nearly one and a half times the length of femur .... *P. longimanus* Staeg.
   Wings not nearly reaching tip of abdomen; fore tibia scarcely longer than femur .... *P. viator* Kieff.
3. Wings with three well defined cross bands, greyish ..... *P. trifascipennis* Zett.
   Wings with two irregular cross bands 4
4. Wings yellow, the apical transverse band without clear spots; abdomen with slightly darkened incisures, the last tergites of ♂ brownish-yellow .... *P. ornatus* Meig.
   Wings brown to red-brown, apical transverse band with clear spots; all tergites of abdomen brown .... *P. varius* Fab.

Genus **Clinotanypus** Kieffer 1918.

Differs from the genus *Trichotanypus* by having bare wings and fourth tarsal segment obliquely truncate and cordiform. There is only one species of *Clinotanypus* described as follows:—

Wings clear and bare, passing abdomen tip; petiole of cubitus equal in length to T_1; R_3+_3 and R_2 very distinct; R_2 not joining R_2+_3; costa longly produced; antennae of ♂ of fifteen segments and of ♀ fourteen segments; fourth tarsal segment obliquely truncate and cordiform; hypopygium black, terminal segment not reaching half basal segment. Whole insect short, stoutly built and shining black .... *C. nervosus* Meig.

Genus **Procladius** Skuse 1889.

General Characters.—Wings bare; cubitus longly petiolate and forking beyond T_2; costa produced; fourth tarsal segment cylindrical and shorter than fifth; antennae of ♂ of fifteen segments.

We have only one representative of the genus.

R_2+_3 forked; transversals darkened; petiole of cubitus quite as long as Cu_1; fore tibia much longer than metatarsus; thorax shining black; antennae of ♂ of fifteen segments, of ♀ thirteen segments .... *P. lugens* Kieff.

Genus **Trichotanypus** Kieffer 1906.

The four British species of the genus *Trichotanypus,* apart from colour differences, are very much alike in form. *T. laetus* Meig. I should not promote to specific rank: it is probably a variety of *culiciformis* L. The only palpable difference I can find is the 'antennal ratio,' which is smaller in *laetus* Meig. There is considerable variation of size in *culiciformis* L. and *crassinervis* Lundstr.

General Characters.—Wings at least partly covered with macrotrichia; petiole of cubitus almost as long as inferior branch; terminal segment of hypopygium bilobed or lanceolate; antennae of ♂ of fifteen segments, of ♀ thirteen segments or rarely fourteen; fourth tarsal segment cylindrical like the others, longer than fifth; eyes bare.

TABLE OF SPECIES.

1. Anterior tibia longer than metatarsus by one-quarter. .... *T. crassinervis* (Zett.) Lundstr.
   Ratio of tibia to metatarsus not so 2
2. Basal and terminal segments of hypopygium of unequal length. .... *T. sagittalis* Kieff.
   Basal and terminal segments of hypopygium of equal length 3
3. Average size larger; Antennal Ratio 1.95—2.0 .... *T. culiciformis* L.
   Average size smaller; Antennal Ratio 1.5 .... *T. laetus* (Meig.).

Genus **Protenthes** Johannsen 1907.

General Characters.—Wings somewhat hairy towards apex; T_2 joining cubitus almost at the fork; petiole of cubitus very short; R_{2+3} forked; antennae of fifteen segments (♂ ♀); pulvilli wanting; fourth tarsal segment longer than fifth; tarsal spurs absent.

Two species only are known to me as British.

TABLE OF SPECIES.

1. Wings with numerous well defined round, brownish spots, the darkest ones lying between R_{4+5} and M .... *P. punctipennis* Meig.
2. Wings with black spots on transversals and grey patch in anal area only .... *P. vilipennis* Kieff.

Genus **Tanypus** Meigen 1803.

The type genus *Tanypus* contains a comparatively large number of species. The points of differentiation, in some cases, are somewhat close and details as to structure of the hypopygium of the ♂, and colour differences in connection with the thorax and abdomen, have had to be included in the table of species.

In the portion of the genus, the species of which have markings upon the wings, it has been found that the ♀ of the species usually possesses these markings much more distinctly than in the ♂, and that the variation in pattern between a ♂ and ♀ of the

same species is almost wholly due to the faintness of the markings in many of the ♂ types.

The size of the species of the genus ranges from approximately 2.5 to 5.5 mm.

General Characters.—Wings hairy; T_2 joining M to Cu_1; fourth tarsal segment cylindrical and longer than fifth; pulvilli wanting; eyes bare; antennae of ♂ usually of fifteen segments, of ♀ twelve to thirteen segments.

TABLE OF SPECIES.

1. Wings clear, without any markings 2
   Wings with some markings 11
2. Whole insect pale yellow-red, thorax same 3
   Thorax showing stripes, sometimes indistinctly 4
3. Anterior ♂ tarsi bearded; abdomen unmarked .... *T. melanops* Wied.
   Anterior ♂ tarsi moderately bearded, all segments of abdomen ringed with brown .... *T. nigropunctatus* Staeg.
   Anterior ♂ tarsi not bearded .... *T. binotatus* Wied.
4. R_{2+3} distinct and forked 5
   R_{2+3} indistinct and fork sometimes absent 7
5. Thorax and legs pale brown; fore tarsi of ♂ moderately bearded; abdominal tergites 1 and 2 white, 3 to 5 with black spot opening on to basal margin and 7 to 8 brown-black .... *T. melanurus* Meig.
   Thorax dark brown and legs whitish; fore tarsi of ♂ longly bearded 6
6. Head and thorax greyish-white; scutellum pale; postnotum not produced .... *T. griseipennis* V.d.W.
   Thorax blackish with blue-grey pruinosity; scutellum black; postnotum sometimes produced in the form of a small nodule. .... *T. barbitarsis* Zett.
7. Transversals close to each other, the distance between less than R—M 8
   Transversals well separated, the distance between greater than R—M; scutal stripes pale brown .... *T. longipalpis* Goet.
8. First three tergites of abdomen white, remainder gradually darkening towards hypopygium, which is blackish-brown, as is also the seventh and eighth tergite .... *T. schineri* Strobl.
   Colour not so 9
9. First two and fifth tergites of abdomen white, remainder partly blackish-brown, hypopygium whitish .... *T. divisus* Walk. (Edw.).
   First tergite of abdomen white, remainder darkening towards hypopygium, which is brown .... *T. nemorum* Goet.
   Abdominal markings otherwise 10
10. Terminal segment of hypopygium distinctly curved; thorax with three reddish-brown bands .... *T. falciger* Kieff.
    (NOTE.—In *falciger* Kieff. var. *nigricans* Goet. the mesonotal bands are black.)
    Terminal segment of hypopygium almost straight; thorax yellowish with reddish-brown bands; metanotum black ... *T. ferrugineicollis* Meig.
    Thorax pale grey with four distinct darker bands; scutellum yellowish white .... *T. cingulatus* Walk.

11. Legs with dark and light rings 12
Legs not so 13
12. Fore tarsi of ♂ bearded .... *T. phatter* Egger.
Fore tarsi of ♂ not bearded .... *T. monilis* L.
13. Wings with several light spots upon a dark background.
.... *T. guttipennis* V.d.W.
Wings with clear background 14
14. Femora with dark ring at apex 15
Femora without dark ring at apex 16
15. Scutal stripes indistinct and of ground colour .... *T. lentiginosus* Fries.
Scutal stripes not of ground colour .... *T. maculipennis* Zett.
16. Apex of wing broadly clear .... *T. carneus* (Fab.) Meig.
Apical dark markings reaching almost to wing tip 17
17. Cell R_5 with darkened spot in middle .... *T. hirtimanus* Kieff.
Cell R_5 without spot in middle 18
18. Wings with two dark transverse bands, the apical band commences beyond the apex of R_2+_3 and extends to wing tip ..... *T. nubilus* Meig.
Wings with two faint transverse bands, the apical one V-shaped and not covering wing tip .... *T. pallidulus* Meig. (Edw.).

Genus **Macropelopia** Thienemann.

The largest representatives of the subfamily Tanypinae are found in this genus, *nebulosa* Meig. attaining 7 mm. in length in the ♂. There are five species which are in general colouring very much alike, but the wings and hypopygia are quite distinctive.

General Characters.—Antennae of fifteen segments (♂ ♀); wings hairy; cubitus sessile; R_2+_3 forked; cross-veins blackened and bordered with black; fourth tarsal segment simple and longer than fifth; pulvilli wanting; empodium large; terminal segment of hypopygium hairy and sometimes thickened.

Table of Species.

1. Wings with smoky spot between R_4+_5 and M 3
Wings without spot between R_5+_4 and M 2
2. Scutellum yellow-brown, remainder of thorax blackish; terminal segment of hypopygium thick and conical .... *T. goetghebueri* Kieff.
Scutellum yellow, remainder of thorax brownish with brownish mesonotal bands; terminal segment of hypopygium slender and curved .... *T. nugax* (Walk.) Edw.
3. Scutal stripes distinct 4
Scutal stripes wanting or scarcely distinguishable .... *T. punctata* Fab.
4. Wings with some spots between fork of Cu_1 and Cu_2 and with three spots in anal cell; hypopygium large, terminal segment laterally convex and distinctly thickened in middle .... *T. nebulosa* Meig.
Wings without spots between Cu_1 and Cu_2, or in anal cell; terminal segment of hypopygium short and evenly pointed .... *T. notata* Meig.

Correction.—On the first line of this article, p. 213 *ante*, for '1880' read '1800.'

Barrule, King George Avenue, Leeds.
1929.

ON SOME CASES OF MATERNAL CARE DISPLAYED BY COCKROACHES AND THEIR SIGNIFICANCE.

BY HUGH SCOTT, M.A., SC.D.

An observation made by myself in South Africa, and considered worthy of publication by those whose special study is the Blattidae, first prompted me to write this article. Till recently I was unaware that any example of maternal care was known in this family, though I was familiar with much that has been written on the care of their eggs and young shown by certain earwigs—and may remark, in passing, that the two groups are not placed very far apart even in modern classifications, and were formerly treated as two families of the same Suborder of Orthoptera. But on following up my observation, with the help of specialists, I find that a number of instances are on record, and that the occurrence of the phenomenon in Blattidae has a quite unusual interest from the evolutionary standpoint. Now to the facts :—

(i) *Poeciloblatta* sp. On Feb. 18th, 1929, I was collecting for a few hours in the Maluti Mountains, Northern Basutoland, in the neighbourhood of Mt. Machacha. I had travelled by motor some thirty miles eastward into the interior from Maseru, the capital, to a branch 'store' at a place called Nyakoesuba, then hired a pony and native guide and ridden as far as possible up into the mountains. The altitude of the spot was probably at least 9,000 feet, near the top of a pass or 'saddle' in the range. The hills were covered with grass full of flowers—for the much-delayed summer rains were beginning—but there were no trees and few bushes, and collecting resolved itself into sweeping herbage and searching under stones. By the latter method I discovered, *inter alia,* two species of cockroaches. One was *Deropeltis erythrocephala* F. (subfam. *Blattinae,* identified by Dr. R. Hanitsch), a winged male and a full-grown wingless female carrying an ootheca; no sign of maternal care was noted in this species. The second was *Poeciloblatta* sp. (subfam. *Perisphaeriinae*), kindly determined by Mons. L. Chopard: seven adult wingless females were collected, and Mons. Chopard thinks the species is probably new, as it does not agree entirely with the descriptions of *P. peringueyi* or *P. bicolor*; while Dr. Uvarov, to whom examples were also submitted for comparison with the Walkerian species *P. tenebrosa* and *P. munda,* reports that the types of both those species are males, and that it is impossible to say whether the females collected by me belong to either of them or not. The insect can, therefore, only be called '*Poeciloblatta* sp.'

Under several stones there was a little pocket in the soil, about one inch deep, out of which ran, when disturbed, a single full-grown female and a number of partly grown young. Had this happened only once, it might be regarded as a chance occurrence, but I saw it repeated a number of times under different stones. I could not stay and investigate further, and it is to be hoped that some entomologist will get to the bottom of the matter. The observation by itself is rather slight, but must be considered in conjunction with the following.

(ii) *Certain viviparous Epilamprinae.* Dr. Hanitsch called my attention to the following remarks by the late R. W. C. Shelford (A Naturalist in Borneo, 1916, Chap. V, pp. 117, 118): 'All the species belonging to the subfamily *Epilamprinae* are viviparous, and in Sarawak I once captured a female of a species belonging to this subfamily, *Pseudophoraspis nebulosa,* with the underside of her body covered with newly-hatched young ones clinging to it. I have no doubt that the young were born alive and then swarmed on to their mother. . . A Ceylon species of Epilamprine, *Phlebonotus pallens,* has been found with the young running about on the upper side of the abdomen of the mother and covered over by the tegmina, or wing-covers. In this species the wings of the female sex are much reduced in size, so that the insect cannot fly. Nevertheless the wing-covers are large and arched, and as beneath them the upper side of the abdomen is depressed with the sides raised up, a sort of box or chamber is formed, inside which the newly-born young can be carried about very comfortably.'

(iii) *Care in the disposition of the eggs.* Berland has put several cases on record in two papers (Bull. Soc. Ent. France, 1924, pp. 70, 71; *op. cit.* 1929, pp. 172-174), the first of which is cited by Prof. E. L. Bouvier (Le Communisme chez les Insectes, 1926, Chap. vii, pp. 103 sqq.). In the earlier article he records how he saw an example of the common flightless South European species, *Loboptera decipiens,* seeking particles of earth which it carried carefully with its mandibles into the burrow of some Hymenopteron. It was found to have placed its ootheca a little way down the burrow and to be building a barricade of earth-particles in front. About thirty particles, the size of a large pin's head, had already been collected, mingled with fragments of vegetable matter. In the later paper Berland cites Adair's observations on *Periplaneta americana* in Egypt: this cockroach was found to prepare carefully a place in which to deposit its ootheca, and then to cover the latter uniformly with particles of wood, plaster or

paper gnawed from the walls or furniture of the room by the mother. He further cites Rau's work on *Blatta orientalis,* in which that American writer shows that, while sometimes the ootheca is merely placed in a crevice and left uncovered, in the majority of cases it is hidden by an accumulation of dust, earth-particles or other débris, agglomerated probably by saliva.

(iv) *Assistance to the young in hatching.* The earliest of all the observations is in some ways the most interesting. It was recorded by A.-D. Hummel in 1821 (Essais entomologiques, No. 1 : Quelques observations sur la Blatte Germanique, *Blatta germanica* Fabr.*) and is also cited by Bouvier, *loc. cit.* Hummel had before him a female *Blattella germanica* which had been captive under glass for more than a week and was carrying on ootheca at the end of its abdomen. He put into the vessel a big ootheca, apparently just dropped by some other female. The captive female at once approached it, felt it and turned it about. At length she took it between her front feet and made in it a slit from one end to the other. The tiny, white, young cockroaches began to emerge, rolled up and attached two and two. The female helped them to free themselves, tapping them gently with her antennae and touching them with her maxillary palpi. In a few seconds they were free and running about, after which no further interest was shown in them by the female. The great importance of this episode lies in the fact that the cockroach helped the young of another female out of the ootheca, while she was already carrying one of her own.

(v) *Cartoblatta pulchra,* Shelford. In the last instance to be here recorded there is no actual proof of maternal care, but the behaviour described may well turn out, with further examination, to belong to that category of phenomena. At any rate the facts in themselves are very interesting. They have been kindly placed at my disposal by Professor Poulton, who received them from Mr. A. Loveridge, F.E.S. The observations, made 14.ii.1923 at Itende, about twelve miles South of Kidete Station, Tanganyika Territory, are best given in Mr. Loveridge's own words : 'I have several times seen groups of immature cockroaches assembled on the boles of trees. One such . . . . was on the trunk of a tree which was growing from a pit situated on a steep hillside, thus though the cockroaches were only eighteen inches from the general ground level they were about five feet up the trunk of the tree. They were arranged in a round rosette whose area was about

* This rare collection of essays was published in St. Petersburg. Through Professor Poulton's kindness I have been able to consult the copy in the library of the Hope Department, Oxford.

equal in size to the palm of my hand. At a little distance this rosette had rather the appearance of a fungoid growth, but as one approached it dissolved into about 100 or 150 young cockroaches. The outer ring of the circle had their heads showing, but their abdomens were hidden by the heads of those in the next ring. I had hardly time to observe whether this orderly arrangement continued right to the centre but that was my impression. As I bent down towards them there was a waving of yellow antennae, after which they scattered and sought to conceal themselves in crevices of the bark.' The adult female is subapterous, and might therefore pass unnoticed among a crowd of young.

The observer was evidently hurried, but we must rely on future investigation to show whether adults were present and caring for the young. Six immature males collected were identified as *Cartoblatta pulchra.*

* * * *

Such are the facts. In what lies their peculiar interest?

If, on the one hand, cockroaches are to be regarded as 'solitary' (*i.e.* non-social) insects, then the manifestation by them of maternal care of their young—not merely the placing of the eggs in a suitable place, but guarding by the parent of the eggs after they are laid and of the young after they are hatched—belongs to a category of rare phenomena, for the exhibition of such maternal solicitude is not common among non-social forms. It is known among DERMAPTERA in *Forficula auricularia* and *Anisolabis maritima*; among HEMIPTERA in *Acanthosoma griseum* and *Aepophilus bonnairei*; among COLEOPTERA (excluding certain 'subsocial' species) in the genus *Copris*; among HYMENOPTERA, in certain sawflies, solitary wasps and Bethyloids. The cases are admirably summarised by Prof. G. H. Carpenter (The Biology of Insects, 1928, Chap. viii, pp. 210 sqq.).

If, on the other hand, Blattidae are considered as showing, in the very acts of behaviour which we are discussing, an approach to a social mode of life, then this again is of special importance in connection with their close structural and phylogenetic relationship to one of the predominant groups of social insects, the ISOPTERA (termites). I need only refer to Bouvier's remarks in the work already cited (*l.c.*) and to Professor Wheeler's comments in 'The Social Insects,'* reviewed in our September number, pp. 210-213. Both Blattidae and Isoptera are traced back, on anatomical grounds, to the same ancestors, the Protoblattoidea, a group

* Pp. 137 sqq., especially pp. 147, 148.

which, so far as is known, became extinct in Permian times at the end of the Palaeozoic Epoch. Present-day cockroaches, at the end of one line of descent, exhibit many features structurally like those of termites, at the end of another line. Is this hypothesis of common ancestry supported by any evidence based on behaviour? Bouvier comments on the gregarious habits of a few species of cockroaches among many solitary-living forms. Both Bouvier and Wheeler remark on the existence (particularly in North America) of certain Blattids which live in colonies, parents and offspring together, eating their way like termites through the soft dead sap-wood of logs and stumps. It has been asked, what more is wanted as a connecting link with the simpler forms of social life manifested by termites? But, as Bouvier justly adds, something more is wanted than a merely colonial form of existence, to wit, dependence of the young on the parents. It is precisely this 'dependence' which is indicated, at any rate to a limited extent, in some of the observations related above. And does not the care of one female for the offspring of another, related more than a century ago by Hummel, afford an inkling of what Wheeler terms the 'vague approach [of cockroaches] to the social habits of the termites'?

Looked at from either angle, therefore, these instances of behaviour merit attention. Probably they go to swell the number of observed intergradations between the solitary and social modes of life, and add weight to Wheeler's contention that the truly solitary mode is much less usual than has been supposed. Moreover, as Bouvier has stated, Blattids, though primitive in form and very ancient as a group, are not necessarily inferior from a psychological standpoint (*à psychisme réduit*). We may yet learn to take a higher view of the humble cockroach.

My thanks for kind help are due to Mons. Chopard, Dr. Hanitsch, Professor Poulton and Dr. Uvarov.

Charlbury, Oxon.
September 4th, 1929.

Editorial.

A limited number of copies of Plate VIII (*Chrysophanus dispar* races) are available, and can be sent to anyone requiring them on the receipt of a stamped addressed envelope and 6*d.* per copy.

THE JAMES EDWARDS COLLECTION OF BRITISH HOMOPTERA, WITH NOTES ON CERTAIN GENERA AND SPECIES.

BY W. E. CHINA, B.A., DIP. AGRIC. (CANTAB.)

On the death of Mr. James Edwards, the well-known British Homopterist, it was decided that an attempt should be made to acquire his Homoptera for the National Collection preserved in the British Museum. Unfortunately, arrangements had already been made for his collection to go to the Castle Museum, Norwich. Thanks, however, to the courtesy and patriotic spirit of the Curator, Mr. Frank Leney, and of the Norwich Museum Committee, the British Museum was enabled to participate in the purchase, the types and specimens of other species not represented in the National Collection, going to the British Museum at South Kensington, and the rest of the collection, including numerous paratypes, remaining in Norwich.

An examination of the collection at Norwich revealed two important facts. Firstly, it was not complete. That is to say, a number of species which in past years had been listed as British by James Edwards were not represented in his collection. Secondly, in most cases, he had made no indication, by label or otherwise, to show which specimen or specimens he regarded as the type or type-series. With regard to the first point, investigation revealed the fact that in 1903 the Dublin Museum had purchased from Edwards a collection of 7,000 specimens of British and European Homoptera. Amongst these were some specimens labelled ' type.' Mr. A. W. Stelfox, who is now in charge of the insects at the National Museum of Ireland, has kindly sent me a list of these types, and they are consequently embodied in the following notes. Even these specimens do not account for all the missing species. Some may remain unlabelled in the Dublin Museum, while others may be in private collections. Owing to Edwards' failure to mark type specimens, it was necessary to make a detailed examination of his collection in order to fix types* from amongst the series of specimens to which he had referred in his original descriptions. In all cases a specimen agreeing with his description and bearing a locality labed identical with one of those localities originally cited was selected. Wherever possible a male specimen with the genitalia dissected was chosen, since his species were generally based on genital differences, and consequently must have been

* It is impossible here to argue as to the necessity of this procedure, but to anyone who has attempted to unravel the complicated synonymy encountered in all systematic work, this necessity is sufficiently obvious.

described from the dissected specimens. In order to make these type fixations valid it is essential to publish the following list :—

CERCOPIDAE.

1. *Aphrophora myricae* Edw., Ent. Mo. Mag., 1926, p. 52.

Type :—Male, with dissected genitalia, from Hoveton, Norfolk, 18. VIII. 1925.

Paratypes :—All specimens labelled Hoveton, Norfolk, and dated 18. VIII. 1925, or 14.X.1925 (Thouless).

Additional county records :—Cambs., Surrey.†

2. *Aphrophora maculata* Edw., Ent. Mo. Mag., 1920, p. 53.

Type : — Male, with dissected genitalia, from Longhope, Gloucester (*i.e.*, Forest of Dean), 31.VIII.1918 (Edwards writes Sept. in error).

Paratypes :— All specimens labelled Hopewood, Longhope, Glos., and dated 31.VIII.1918.

Additional county records :—Wilts., Herts.

JASSIDAE.

3. *Megophthalmus scabripennis* Edw., Ent. Mo. Mag., 1915, p. 206.

Type :—Male, with dissected genitalia, from Weston-super-Mare, Somerset, 10.VIII.1908.

Paratypes :—Specimens from Weston-super-Mare, Somerset; Hope Hills and Colwyn Bay, Denbighshire; Symmonds Yat and Credenhill, Hereford; Snowden, Carnarvon; Pendine, Carmarthen; Sherwood Forest, Bulwood Forest and Linby, Notts., collected before July, 1915, in the Edwards, Butler and Carr collections may be regarded as paratypes.

It is doubtful if the scabrosity of the corium is a sufficiently definite character to separate this species from *scanicus* without dissection of genitalia. If it is, then, the distribution of *M. scabripennis* can be greatly extended, for it seems to occur wherever *M. scanicus* occurs.

Additional county records :—Norfolk, Kent, Surrey, Hampshire (I.W.), Sussex and Wilts.

4. *Oncopsis carpinicola* Edw., Ent. Mo. Mag., 1920, p. 54.

Type :— Male, with dissected genitalia, from Colesborne, Gloucester, 21.VI.1904.

Paratypes :—Specimens in the Edwards Collection collected on hornbeam at Colesborne, before March, 1920, may be regarded as paratypes.

† It is not actually clear whether the label Chilworth refers to Surrey, Hants, or Oxon.

There are also specimens of *O. carpinicola* labelled ab. *scapularis* Edw., Colesborne, 22.VII.1916, ab. *triangularis* Edw., Colesborne, 11.VI.1916, and ab. *dimidiata* Edw., Colesborne, 2.VII.1916, all of which have been regarded as the types of the respective aberrations.

5. *Oncopsis avellanae* Edw., Ent. Mo. Mag., 1920, p. 54.
Type:—Male, with dissected genitalia, from Colesborne, Gloucester, 10.VI.1915.
Paratypes:—The collection only contains specimens from Colesborne (no locality given originally).
There are also specimens of *O. avellanae* labelled ab. *scapularis* Edw., Colesborne, 10.VI.1915, and ab. *dimidiata* Edw., Colesborne, 22.VII.1916, both of which have been regarded as types of these aberrations.

6. *Macropsis scotti* Edw., Ent. Mo. Mag., 1920, p. 55.
Type:—Male from Colesborne, Gloucester, labelled '*M. scotti* Edw. J. Edwards det.' in Edwards' handwriting.
Paratypes:—No definite locality was given originally.
Additional county records:—Norfolk.

7. *Macropsis decoratus* Edw., Ent. Mo. Mag., 1919, p. 55.
Type:—Female from Bath, Somerset, 1915 (Edmonds).
Paratype:—Female with same data.

8. *Macropsis populi* Edw., Ent. Mo. Mag., 1919, p. 56.
Type:—Male from Goring, Oxon, Aug., 1918 (Butler).
Paratypes:—Males and females with same data.

9. *Idiocerus cupreus* Edw., Hem.-Hom. Brit. Is., 1896, p. 263.
This species, which was recorded as British on a single female taken by Mr. Thouless off *Salix alba* at Brandon, Norfolk, 25.V.1896, is neither represented in the British Museum nor in Edwards Collection. The original type specimen is either in Mr. Thouless' collection or in the Dublin Museum.

10. *Idiocerus viduatus* Edw., Trans. Ent. Soc. Lond., 1886, p. 118.
Type:—In Dublin Museum (*fide* Stelfox).
This species was later regarded by Edwards as a female variety of *I. elegans* Flor., and should be known as *I. elegans* Flor. var. *viduatus* Edw.

11. *Idiocerus rutilans* Kbm.
In the collection are two specimens labelled '*Idiocerus rutilans* Kbm.,' without data but probably from Colesborne. In the West Collection at the British Museum are several specimens from Wisley and Oxshott, Surrey, determined by Edwards on 6.XI.1908 as *I. rutilans* Kbm. I am unable to

trace any record of this addition to the British List. Oshanin regards *I. rutilans* as a synonym of *I. elegans* Flor., but the specimens determined by Edwards are quite distinct from *elegans* and more closely resemble *I. vitreus* F. P. Löw states that *I. rutilans* Kbm. is synonymous with *I. signatus* Fieb. If this is so Oshanin's synonymy must be incorrect, since he regards *I. signatus* as distinct from *I. elegans.*

12. *Idiocerus albicans* ab. *fusco-coerulens* Edw., Ent. Mo. Mag., 1915, p. 206.
Type :—Female ex white poplar, Norwich (Thouless).

13. *Acocephalus aestuarinus* Edw., Ent. Mo. Mag., 1908, p. 57.
Type :—Male, with dissected genitalia, from Wells, Norfolk, 28.VIII.1907.
Paratypes :—Males and females with same data.

14. *Acocephalus limicola* Edw., Ent. Mo. Mag., 1908, p. 57.
Type :—Male, with dissected genitalia, from Wells, Norfolk, 28.VIII.1907.
Paratypes :—Males and females with same data, also from Hunstanton, 30.VIII.1886.

15. *Acocephalus kirschbaumi* Edw., Ent. Mo. Mag., 1920, p. 55.
Type :—Male, with dissected genitalia, from Pett, Sussex, August, 1902 (Butler).
Paratypes :—Specimens from Ewhurst, Surrey, August 1889, and Pevensey, Sussex, August 1902 (Butler).

16. *Deltocephalus repletus* Edw. nec Fieb.
According to the labels on specimens in Edwards Collection, the British examples of this species have been wrongly determined in the past, and are merely forms of *distinguendus* Flor. The British list is therefore diminished by one species.

17. *Deltocephalus halophilus* Edw., Ent. Mo. Mag., 1924. p. 53.
Type :— Male, with dissected genitalia, from Weybourne, Norfolk, 19.IX.1908.
Paratypes :—Males and females from Brean Down, Somerset, 24.VIII.1918, Gloucester (Severn); Point of Air, Flintshire, 29.VIII.1922 (Dixon).

18. *Deltocephalus thenii* Edw., Ent. Mo. Mag., 1915, p. 208.
Type :—Male, with dissected genitalia, from Ringland, Norfolk, 13.IX.1913.
Edwards gave no definite localities. His *D. thenii* was merely a new name for *D. striatus* auct. nec Linné. Edwards stated that the true *D. striatus* (L.) occurred only in coast

marshes at Weyborne and Wells, Norfolk, but in his collection are specimens from Gloucester, Cheshire and Worcestershire.

19. *Deltocephalus oculatus* J. Sahlb.
Not represented.

20. *Deltocephalus picturatus* Fieb.
Not represented.

21. *Deltocephalus linnei* Fieb.
Not represented.

22. *Deltocephalus falleni* Fieb.
Specimens are labelled 'recte *distinguendus*.'

23. *Deltocephalus paleaceus* J. Sahlb.
Not represented, either in Edwards' Collection or in the British Museum Collection. The specimens from Brooke Wood, Norfolk, on which the British record is based are probably in the Dublin Museum.

24. *Deltocephalus minki* Fieb.
Not represented.

25. *Recilia coronifer* Marsh. (*Deltocephalus*).
There are no specimens of this species in Edwards Collection, and although this species was recorded by Edwards from Lowestoft and Maidenhead (Butler), there are no specimens in the Butler Collections. However, *R. coroniceps* Kbm., which is found in both collections, is almost certainly synonymous with *R. coronifer* Marsh, which takes priority.

26. *Ophiola striatulellus* Edw. (*Thamnotettix*), Ent. Mo. Mag., 1894, p. 102.
Type :—Male from Roudham Heath, Norfolk, 4.VIII.1890.
Paratype :—One female with same data.

27. *Ophiola corniculus* Marsh.
This species has so far been regarded as synonymous with *O. striatulus* Fall., but recently Mr. C. A. W. Duffield has drawn attention to its distinctive appearance. Investigation shows that these two species are distinct. The N. American *Ophiola plutonia* Uhler (=*Athysanus instabilis* V.D.= *A. elongatus* Osb. *fide* Ball) and the Continental *A. orichalceus* Thoms., are also synonymous with *O. corniculus*. The Edwards Collection contains specimens of both species under the name *striatulus* Fall.
County records :—Surrey, Cheshire, Hampshire, Gloucester, Carmarthen and Scotland (Rannoch).

28. *Limotettix persimilis* Edw., Ent. Mo. Mag., 1920, p. 57.

Type :— Male, with dissected genitalia, from Colesborne, Gloucester, 20.VII.1915.

Paratypes :—Males and females, Colesborne, IX.1919, and Tintagel, Cornwall, Aug. 1908 (Butler).

29. *Limotettix saturata* Edw., Ent. Mo. Mag., 1915, p. 208.

Type :—Male, with dissected genitalia, from Hoveton, Norfolk, 2.IX.1911.

Paratypes :— Specimens with same data, also from Leith Hill, Surrey, Aug. 1895; Gomshall, Surrey, and Chilworth (Surrey?).

30. *Limotettix aurantipes* Edw., Ent. Mo. Mag., 1894, p. 103.

This species was originally recorded as British on the basis of specimens collected by Butler at Wonersh, Gomshall and Chobham, Surrey, and at Burnham Beeches, Bucks. There are no specimens from these localities in Edwards Collection, and a male from Wonersh, Aug. 1892 (Butler Collection, British Museum), has been fixed as the type.

31. *Cicadula viridigrisea* Edw., Ent. Mo. Mag., 1924, p. 54.

Type : — Male, with dissected genitalia, from S. Cerney, Gloucester, 27.VIII.1919.

Paratypes :—Specimens in Edwards Collection from Woolaston and Newnham (Gloucester), Newchurch Common (Cheshire), Symmonds Yat, Huntsham Hill (Hereford), collected before March 1924.

32. *Cicadula laevis* Ribaut,* Bull. Soc. Hist. Nat. Toulouse, LVI, p. 162, 1927.

There are several specimens in the collection which have been determined by Edwards as *C. laevis* Ribaut. These are from Colesborne, Glos., 10.VI.1921, and Hartlebury Common, Worcester, 11.IX.1920. This is an addition to the British list.

33. *Cicadula livida* Edw., Ent. Mo. Mag., 1894, p. 104.

Type :—Male, with dissected genitalia, from Weyborne, Norfolk, 18.X.1888.

34. *Cicadula fieberi* Edw., Ent. Mo. Mag., 1891, p. 32.

This is merely a new name for *C. frontalis* Fieb. nec Scott.

35. *Cicadula frontalis* Scott.

Possibly synonymous with *C. variata* Hardy.

36. *Dikraneura similis* Edw., Ent. Mo. Mag., 1885, p. 229.

Described from specimens collected at Stratton Strawless, Norfolk. There are no specimens from this locality in Edwards' Collection. The type is probably in the Dublin

* For distinctive genital characters see Ribaut's excellent paper.

Museum. A pair of paratypes from Stratton Strawless, Norfolk, 9.VII.1885, are in the Douglas Collection (Brit. Mus.).

37. *Dikraneura pygmaea* Doug.

Mr. C. A. W. Duffield has pointed out that this is merely the male of *Erythroneura* (*Zygina*) *hyperici* H.S.

38. *Empoasca populi* Edw., Ent. Mo. Mag., 1908, p. 81.

Type :—Male from Colesborne, Glos. ex *Populus canescens*, 5.X.1906.

No definite locality given in original description.

39. *Empoasca butleri* Edw., Ent. Mo. Mag., 1908, p. 82.

Type :—Male from Pendine, Carmarthen, IX.1907 (Butler).

Paratypes :—Specimens with same data, also from Towyn, Denbigh. (Butler).

40. *Chlorita apicalis* Flor.

Not represented. Doubtfully British.

41. *Eupteryx britteni* Edw., Ent. Mo. Mag., 1924, p. 54; 1926, p. 53.

Type :—Male, with dissected genitalia, from Great Salkeld, Cumberland, 23.X.1912 (Britten).

Paratypes :—Specimens with same data.

42. *Eupteryx thoulessi* Edw., Ent. Mo. Mag., 1926, p. 53.

Type :—Male from Hoveton, Norfolk, 12.IX.1925 (Thouless).

Paratypes : — Specimens from Hoveton, dated 12, 19 and 26.IX.1925.

43. *Eupteryx simplex* Edw., Ent. Mo. Mag., 1926, p. 53.

Type :—Male from Hoveton, Norfolk, 23.VIII.1925.

44. *Typhlocyba douglasi* Edw., Ent. Mo. Mag., 1878, p. 248.

Described from specimens collected from firs in March, and blackthorn in September, near Norwich. There are no specimens from this locality in Edwards' Collection, and it is probable that the type and paratypes are in the Dublin Museum.

45. *Typhlocyba lethierryi* Edw., Ent. Mo. Mag., 1881, p. 224.

No definite locality was given in the original description, which was based on specimens collected by Douglas from maple and lime, and by Edwards from black poplar. There are no such specimens in Edwards' Collection. A male collected by Douglas on lime (Douglas Collection, Brit. Mus.) has been fixed as the type with specimens from maple and lime as paratypes. These undoubtedly formed part of the material sent by Douglas to Edwards.

46. *Typhlocyba hippocastani* Edw., Ent. Mo. Mag., 1888, p. 157.
This species, which is now regarded as synonymous with *T. lethierryi,* was described from specimens collected by Douglas on horse-chestnut at Lewisham in October.
Type :—Male from horse-chestnut, Lewisham, Kent, in the Douglas Collection (Brit. Mus.).
Paratypes :—Males and females from same locality (Douglas Collection). These specimens formed part of the material sent by Douglas to Edwards.

47. *Typhlocyba salicicola* Edw., Ent. Mo. Mag., 1885, p. 230.
No definite locality was given in the original description. In Edwards' Collection there are no specimens dated prior to 1885. The type is probably in the Dublin Museum.

48. *Typhlocyba avellanae* Edw., Ent. Mo. Mag., 1888, p. 157.
This species was described from specimens collected by Douglas on hazel at Lewisham, Kent, in October.
Type :—Male from hazel, Lewisham, in Douglas Coll. (Brit. Mus.).
Paratypes :—Females with same data.

49. *Typhlocyba pruni* Edw., Ent. Mo. Mag., 1888, p. 158.
Described originally from a single specimen collected on wild plum at Arminghall, Norwich, 23.IX.1888. This species is not represented in the collection. The type specimen is probably in the Dublin Museum.

50. *Typhlocyba opaca* Edw., Ent. Mo. Mag., 1888, p. 158.
This species, which was described from specimens collected on horse-chestnut by Douglas at Lewisham, Kent, in October, is not represented in the Edwards Collection. In the Douglas Collection (Brit. Mus.) are two females (paratypes) from horse-chestnut laballed '*T. opaca* n. sp,' but the type must be a dissected male. This specimen is probably in the Dublin Museum.

51. *Typhlocyba alnicola* Edw., Ent. Mo. Mag., 1924, p. 54.
Type :—Male, with dissected genitalia, from Colesborne, Gloucester, ex alder, 8.VII.1922.
Paratypes :—Specimens with same data.

52. *Typhlocyba nigriloba* Edw., Ent. Mo. Mag., 1924, p. 55.
Type :—Male, with dissected genitalia, from Colesborne, Gloucester, ex sycamore, 20.VII.1921.
Paratypes :—Specimens from Colesborne, dated 17 or 20.VII. 1921, and from Cumberland (Britten).

53. *Typhlocyba spinigera* Edw., Ent. Mo. Mag., 1924, p. 55.
Type :—Male, with dissected genitalia, from Colesborne, Gloucester, ex hazel, 22.VIII.1922.
Paratypes :—Specimens from Colesborne dated 30.VII or 22.VII.1922.

54. *Typhlocyba fratercula* Edw., Ent. Mo. Mag., 1908, p. 84.
Type :—Male, with dissected genitalia, from Colesborne, Gloucester, ex beech, 3.X.1895.
Paratypes :—Specimens from Colesborne dated Oct. 1895.

55. *Typhlocyba frustrator* Edw., Ent. Mo. Mag., 1908, p. 84.
Described from specimens ex elm and beech, Colesborne, Norfolk. There are no specimens dated prior to 1908 in Edwards' Collection. The type is therefore missing, but dissected males from Colesborne determined by Edwards as *T. frustrator* are in the Brit. Mus. Coll.

56. *Typhlocyba betulicola* Edw., Ent. Mo. Mag., 1925, p. 64.
Described from specimens ex birch, no definite locality given.
Type :—Male, with dissected genitalia, from Newchurch Common, Cheshire, ex birch, 5.IX.1921.
Additional county records :—Gloucester.

57. *Typhlocyba tridentata* Edw. (*Anomia*), Ent. Mo. Mag., 1928, p. 80.
Type :—Male, ex *Cornus sanguinea*, Colesborne, Gloucester, 12.VII.1922.

(To be concluded.)

NOTE ON THE MATING HABITS OF *RHYSSA PERSUASORIA* LINN.

BY H. G. CHAMPION, M.A., F.E.S., I.F.S.

In the course of some work in a deodar forest at Konain (7,000 ft.) in the Chakrata Forest Division in the West Himalaya, my attention was attracted by a buzz of insects to a pole felled the previous year. I found the sound to originate from a tangled heap of males of *Rhyssa persuasoria* crawling over and around a female in the act of emerging from the log. There were twelve to fifteen of them, all much too intently interested in the tussle to take alarm at my presence, or even at my attempt to remove at least some of them with a twig. After watching them for about ten minutes I had to go on, so I blew gently on the mass, and, on the temporary removal of the males, found that the female had succeeded in pulling herself about two-thirds of the way out of the

exit passage and that one of the males had for about half its length forced his abdomen into the passage, and a second male was also more or less similarly jammed in and unable at once to fly off. These two males ultimately freed themselves, but remained close to the female while I assisted her to complete her exit by giving her a twig on which to obtain a purchase—and even then she found it hard work. The moment she was free, however, she took to flight, none of the males present succeeding in pairing with her as she made off.

During the next few days, I twice again saw the same sort of thing going on, but in the earlier stages. The first time only the head of the female was visible level with the wood surface about to emerge, and five or six males were dancing attendance. The second time, there was a similar collection of males, but on driving them off, I could not see the emergence hole, and a misdirected blow with a *khukri* spoiled the chance of further examination.

There is no doubt that the males can sense the presence of the female well before she emerges, and collecting round the exit hole scramble for possession : it looked possible that copulation might take place just before emergence is complete, or at least at the very moment it is so. From the recent literature I have seen, I gather that this behaviour has not actually been noted for this species, though established for others of the genus.

I had been watching the females employed in oviposition (or attempts at it) the previous season in the same place, having on several occasions found them with ovipositor fixed in a fallen tree or post, but each time without finding any signs of a *Sirex* larva in the immediate vicinity. It was slightly later in the season, and no males were seen.

Dehra Dun, U.P., India.
July 15th, 1929.

DESCRIPTION OF A NEW INDIAN *SPHEX*.

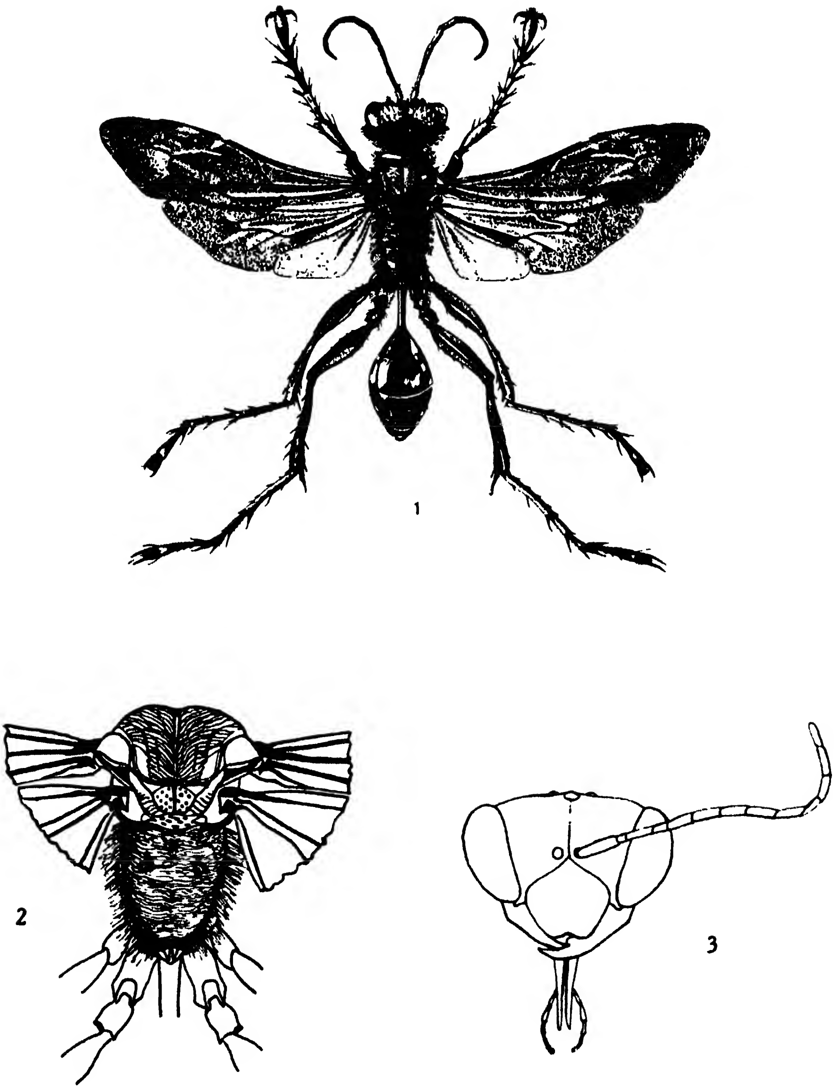
BY W. B. R. LAIDLAW, B.SC.

PLATE IX.

Sphex namkumiensis n. sp.

Head smooth, shining, impunctate, wider than thorax; clypeus convex, anterior margin medially notched.

Pronotum impunctate, smooth; mesonotum transversely striate, medially grooved, the striae curved forward to meet it; scutellum prominent, raised, shining, with a median longitudinal notch, and scattered coarse punctures, the axillary area transversely striate; metanotum shining, entire, with elongate



Sphex namkumiensis n. sp.

W. B. R. L. del.

scattered punctures; median segment transversely striate; legs long, smooth, tibiae and tarsi spinose; claws bidentate, teeth prominent; petiole smooth, shining, as long as the second and third hind tarsal joints together, or as the first and half of the second abdominal segments together; abdomen smooth, shining, sub-globular.

Clypeus and sides of frons nearly to vertex, pronotum, legs, apical half of abdominal segments covered with silvery pile, densest on the frons and clypeus, faintly and only visible in certain lights on the abdomen, and merging to golden brown at the inner apices of the hind tibiae; the vertex and behind head, sides of pronotum, mesonotum, strongly on the pleurae and median segment, with stiff long black pubescence; a few scattered black hairs on the legs, extending half-way down the femora and on the apical margin of the abdomen.

Colour black; claws piceous; wings fuscous with some paler translucent streaks and patches—notably one behind the stigma, and one in the cubital area, intersecting the veins enclosing the second cubital cell—and with a broad, barely perceptibly, darker margin.

Length 13½ mm.; expanse of wings 22 mm.

Locality: Namkum, Bengal.

Type ♀ in Coll. Royal Scottish Museum (1929, 123).

EXPLANATION OF PLATE IX.

Fig. 1. *Sphex namkumiensis* n. sp. × 3.
,, 2. Thorax × 6.
,, 3. Front of head × 8.

Orkie, Lanark Road, Colinton, Edinburgh.
August 6th, 1929.

Halictus angusticeps Perk. in Dorset.—This species was first described as new to science by Dr. R. C. L. Perkins in 1895, from specimens of the ♂ taken at Sidmouth [see Ent. Mo. Mag., 1895, p. 39]. ♂♂ had also previously been taken on the coast between Weymouth and Lulworth (Dorset).

In August of last year, at the instigation of Dr. Perkins, I made a point of looking for this species along the coast in the Weymouth district, and found the ♂♂ occurring in some numbers along a limited stretch of the shore near Ringstead (15.viii.28). The coast just at this point is formed of irregular slopes of Kimmeridge Clay, mostly covered with vegetation, but considerable areas of exposed ground where the slope is greatest, or where the soil has slipped away. There is quite a wide beach of large pebbles extending well beyond normal high tide mark, and only at the very highest tides can the sea reach the clay slopes. The *Halicti* occurred at the bottom of the slopes, right on the edge of the beach, and there only. They were flying in company with ♂♂ of *Halictus villosulus* K. over banks of stiff clay. No specimens of the ♀ were taken, either on this day or on a subsequent occasion, when, however, the weather conditions were poor.

During the past June, in the same situation, the ♀♀ were occurring plentifully, stocking burrows in the stiff clay exposures on the edge of the beach. Further up the slopes they did not occur (except in so far as they visited flowers in this region), although *Halictus villosulus* ♀♀ were burrowing in almost any patch of exposed ground.

The ♀ of *Halictus angusticeps* Perk. is hitherto undescribed. I find, however, that there are three specimens in the British Museum Collection. They are labelled 'E. Saunders coll., F. D. Morice ded. 1910.' Evidently Morice recognised them as belonging to this species. In character it closely resembles *H. punctatissimus* Sch., but may be distinguished quite definitely by the following characters:—

Head above the antennae with much larger punctures.

Mesonotum more largely punctured. As the punctures are not decreased in number, there is less space between them.

(There is also a distinction in the shape of the anterior portion of the mesonotum, which has a constant form in *angusticeps*, but varies in *punctatissimus*.)

Type specimens have been placed in the British Museum Collection.

In addition to the Ringstead specimens, I took a single ♀ on Portland, 17.vi.29. The British Museum specimens of the ♀ bear the dates: 'Seaton, 5.99'; Weymouth, 9.97'; 'Weymouth, 7.02.' Evidently the species occurs locally along the coast of Dorset and E. Devon, but it is not possible at present to say anything about the limits of its distribution within that range.—G. M. Spooner, Christ's College, Cambridge: *September 23rd*, 1929.

Cross-pairing between different species of Phyllobius.—While beating birches in Epping Forest on the 3rd July last, two pairs of *Phyllobii in cop.* tumbled into the net from one tree; one of these pairs were ♂ and ♀ of *P. argentatus* L., and the other a ♂ of *P. argentatus* and a ♀ *P. pyri*.

Cross-pairing in this genus is not unknown, and two instances are given by Mr. Donisthorpe in Col. Brit. Islands, Vol. VI, p. 306, namely, between *P. calcaratus* and *P. alneti* in the Gelt Woods, Cumberland, observed by himself, and between *P. pyri* and *P. pomonae* at Clacton by Dr. Cameron; but as I do not know of any others, and had never met with a similar occurrence in thirty years' collecting, I thought my own observation might be worth recording.

I may add that I boxed the weevils and they were still *in cop.* on reaching home some hours later.—F. B. Jennings, 152 Silver Street, Upper Edmonton, N.18: *August 21st*, 1929.

Phaedon tumidulus Germ. (Col.).—A further note, additional to those of Messrs. G. B. Walsh and J. J. Walker in the September number of this Magazine (*antea*, p. 209) may be of interest.

The adult beetle appears (from observations in Somerset and Wiltshire) to attack more species of Umbelliferae than the larvae. The larvae are confined to the radical leaves of Hogweed (*Heracleum Sphondylium*), the most common larval host plant, but all the leaves of Procumbent Celery (*Apium nodiflorum*) are at times severely attacked. The early spring adult damage is negligible, as the number of beetles has been considerably reduced during the period of hibernation. It is the summer adults seen in July that cause severe damage to several species of wild Umbelliferae; the larvae of these beetles are very numerous and appear free of enemies.

A. Roebuck (Linc. Nat. Union Trans., 1927) mentions the beetle as a potential pest of Celery.

A paper will be published shortly on the life-history of the beetle, with a description of the larvae.—H. G. H. Kearns, The University, Bristol: *September 12th*, 1929.

Myelois cirrigerella Zinck. from a new locality.—Just before sunset on the evening of July 9th, 1929, while collecting Micro-lepidoptera in a sandy field at Tubney, in the north of Berkshire, I disturbed from a plant of *Centaurea Scabiosa* a yellowish moth, which made its way through the short grass with a peculiar buzzing flight. This proved to be the rare Phycid *Myelois cirrigerella,* of which the only known British specimens are those from Wiltshire recorded in Meyrick's 'Revised Handbook,' and one captured by Mr. Wm. Fassnidge in 1927 on Farley Down, near Winchester (see Ent. Record, xxxix, 1927, p. 176). Mr. Meyrick was good enough to confirm my identification of the specimen, which, apart from a small chip out of the apex of one forewing, is in satisfactory condition. Although I returned to the spot on July 11th, 16th and 25th, a second example was not forthcoming. Mr. Fassnidge has put together a useful collection of records and references concerning this species in the Transactions of the Hampshire Entomological Society, 1928, pp. 34 ff. Whether it is on the increase in southern England, or has merely been overlooked, seems impossible to determine, Micro-lepidopterists being so few and far between. It does not seem likely to me that any lepidopterist of experience would mistake it for a *Crambus*; one's attention is drawn to it, not only by its flight, but also by the striking orange colour of the head and thorax. The fact that I disturbed this example from *Centaurea* is of little significance, as flowering plants of all kinds abounded close by, including *Scabiosa* (*Knautia*) *arvensis*, on which *cirrigerella* is known to feed.—E. G. R. Waters, Oxford: *August*, 1929.

Society

Entomological Club.—Two meetings of the Entomological Club were held at Oxford—on July 13th, Professor E. B. Poulton in the Chair, and July 14th, Dr. Harry Eltringham in the Chair.

Members present in addition to the Chairman: Messrs. R. Adkin, H. Donisthorpe, H. Willoughby-Ellis, J. E. Collin and W. J. Kaye. Visitors present: Prof. E. G. R. Waters, Dr. P. Hanitsch, Dr. Hugh Scott, Commander J. J. Walker, Messrs. A. W. J. Pomeroy, H. E. Andrewes, H. J. Turner, C. J. Wainwright and E. Bolton King.

On Saturday, July 13th, the members and visitors met at the Hope Department of the University Museum at 3 p.m., and were received by Prof. and Mrs. Poulton and Dr. Eltringham. The afternoon was spent in examining the fine collections and the very interesting research work now being carried out by Dr. Eltringham, some results of which have been reported in the Transactions of the Entomological Society of London. Tea was provided at 4 o'clock. The guests then adjourned to their quarters in New College, and assembled at Jesus College at 8 p.m., when dinner was served, Prof. Poulton occupying the Chair.

On Sunday morning, July 14th, the Entomological Collections at the Hope Department were again open to inspection, and, in beautiful weather, various excursions were made in the town and vicinity. Lunch was provided at New College, and in the afternoon an entomological excursion was organised in motor-cars to that renowned collecting-ground, Bagley Wood, Berks.

The party again met at Jesus College in the evening, where dinner was served at 8 p.m., Dr. Harry Eltringham in the Chair.

The weather throughout the visit was very fine and warm, and during Monday morning the guests dispersed, after a most successful and entertaining meeting.—H. Willoughby Ellis, *Hon. Sec.*

AN ANNOTATED LIST OF THE ADDITIONS TO THE BRITISH COLEOPTEROUS FAUNA, MADE SINCE THE PUBLICATION OF THE SUPPLEMENTARY VOLUME (VI) OF FOWLER'S 'COLEOPTERA OF THE BRITISH ISLANDS.'

BL HORACE ST. J. DONISTHORPE, F.Z.S., etc.

(*Continued from p.* 196.)

Helophorus diffinis Sharp, Ent. Mo. Mag., **52,** 168 (1916). (Plate B, fig. 4.)

The front angles of the thorax are broadly pallid yellow, and this colour extends along the sides of the front margin; the eyes are more convex than usual, and the margin of the ocular cavity is correspondingly more elevated; the sculpture of the thorax is remarkably fine, and the rather long stout legs are very pallid; the coxae, however, are black. It does not vary much, except that the colour of the median and sub-median intervals is sometimes bluish-green. The aedeagus is remarkably distinct.

Dr. Sharp remarks: 'This species is apparently passed over at present as a variety of *affinis;* it is, however, perfectly distinct, and the mistake is probably due to its rarity.'

Brockenhurst (Sharp); Lee, Kent (Champion); Sandown, Isle of Wight, 15.viii.08, and Isle of Sheppey, 3.ix.08 (Donisthorpe).

Helophorus ytenensis Sharp, Ent. Mo. Mag., **50,** 103 (1914).

Small, convex, black, head and thorax metallic, the palpi, the base of the antennae and the legs testaceous, the terminal joints of the palpi and tarsi blackish towards the apex; thorax strongly granulose, the furrows narrow; elytra dirty testaceous, indistinctly marked with black, strongly and deeply punctate-striate, the interstices narrow, equal; wings broad but abbreviated. Long, 2.5 mm.

This species is closely allied to *H. granularis* L., but is easily distinguished from it and from all the other species of the genus. It varies somewhat in size and form, but the abbreviated wings are a constant character.

Cairn Water, Dumfries-shire, and New Forest (Sharp); North of Ireland (Balfour-Browne); Padstow (Lamb).

Sphaeridium quadrimaculatum Marsh., Ent. Brit., 66 (1802) [Joy, Ent. Mo. Mag., **50,** 83 (1914)].

According to Dr. Joy this insect is a good species and comes between *S. bipustulatum* F. and *S. scarabaeoides* L. From the former it differs in being broader and less convex; the base of the thorax is only slightly biarcuate, and the hinder angles are obtuse and slightly blunt. From the former it may be known by the fact that at least the front part of the side margins of the thorax is narrowly yellow, the base is more biarcuate, the hind angles less abtuse, and the tibiae are yellow. It appears to be intermediate in size between the other two species—*S. bipustulatum* being the

smallest of the three. According to Joy's figure the aedeagus of *quadrimaculatum* is more pointed than in the other two species. Reitter considers it to be an aberration of *bipustulatum*. The three forms appear to be equally common in Britain. The aberration *lunatum* F. of *scarabaeoides* seems to be decidedly rare in Britain.

Cercyon lugubris Pk. ab. **intermixtus** Sharp, Ent. Mo. Mag., **54,** 276 (1918).

This aberration is extremely similar to typical *C. lugubris*, but narrower, very convex, the head being especially narrower. The sternal structure is almost the same but the male characters are a little different, being more delicate.

Weybridge and Hampstead (Sharp, 1864); with the type in several localities.

Cercyon sternalis Sharp, Ent. Mo. Mag., **54,** 276 (1918). (Plate B, fig. 5.)

Oval, convex, black; the palpi, the antennae at the base, and the apex of the elytra dirty testaceous, elytra silken-subopaque, striate, the striae deep at the base; mesosternal lamina protuberant, broad, contiguous with the apex of the metasternum. Long, 2 mm.

Very similar to the smallest examples of *C. minutus*, but easily distinguished by the striation of the apex of the elytra and by the sternal structure. The front of the metasternal area is strongly elevated and overlaps the tip of the mesosternal lamina, hence the lumen, or space above their conjunction, is large. The mesosternal lamina is broad and, like the metasternal area, strongly punctured.

This species is easily distinguished from *C. lugubris* and the ab. *intermixtus* by the structure of the sterna, the mesosternal lamina being markedly broader.

Hammersmith Marshes (Sharp and Power); Sheppey (Walker); Slapton Ley (Keys); Yarnton, near Oxford (J. Collins).

Cercyon pumilio Sharp, Ent. Mo. Mag., **54,** 277 (1918).

Oval, narrow, strongly convex, black palpi; antennae at the base, legs and apex of the elytra testaceous; elytra smooth, subopaque, striate, striae deep at the apex; mesosternal lamina somewhat protuberant and broad, with the base contiguous with the metasternum; legs thin. Long, vix 1.5 mm.

This minute insect is only as large as *C. pygmaeus;* and, though closely allied to *C. sternalis,* Dr. Sharp did not think it will prove to be a variety of that species, it being only one-fourth the bulk thereof, of a slightly different shape, and the mesosternal lamina not quite so broad.

Hammersmith Marshes, March 7, 1863, one specimen (Sharp).

STAPHYLINIDAE.

Aleochara crassicornis Lac., Faun. Entom. Environs Paris, **1**, 531 (1835) [Donisthorpe, Ent. Rec., **37**, 166 (1925)].

Black, elytra red, with the base and neighbourhood of the scutellum narrowly, the sides more broadly, blackish. Legs red-brown, with lighter tarsi. Upper surface shining, but shagreened between the punctures. Antennae not spindle-shaped, the 3rd joint of the antennae slightly longer than the 2nd, joints 5-10 twice as long as broad. Head much smaller than the thorax; thorax evenly punctured without a row of punctures on disc. Elytra with rasp-like punctures, the spaces between as broad as the punctures. The fine hairs of the elytra behind are directed outwards from the suture; a single elytron not longer than broad. Abdomen shining feebly, narrowed at apex, somewhat unevenly punctured, being less so at the base. Only three of the visible segments with a distinct transverse impression at the base, and no tubercles on the segments in the male. Legs not extra long, the hind tarsi scarcely as long at the tibiae. Long, 2.4—4.5 mm.

In decaying fungus. Windsor Forest, 1.x.25 (Donisthorpe).

Oxypoda nigrocincta Muls. et Rey, Ann. Soc. Linn. Lyon, **21**, 192 (1874) [Donisthorpe, Ent. Mo. Mag., **60**, 198 (1924)]. (Plate B, fig. 6.)

Elongate, narrow, slightly convex, very finely and densely pubescent, of a slightly brilliant reddish colour, with the head, the disc of the elytra and the fourth abdominal segment darker, the mouth, the base of the antennae and the legs testaceous. Head finely and densely punctured. Antennae with the third joint a little shorter than the second, the sixth to the tenth strongly transverse. Prothorax subtransverse, contracted behind, slightly arched at the sides, almost as broad behind as the elytra, the posterior angles obtuse and not rounded, obsoletely impressed towards the base, finely and densely punctured. Elytra transverse, a little longer than the prothorax, subdepressed, finely, very densely and subrugosely punctured. Abdomen subparallel, not setose towards the apex, finely shagreened. Length, 1 line.

O. nigrocincta is quite unlike any other species we possess. From *O. amoena* it differs in its darker colouring and the longer antennae with less transverse joints. It is a narrower insect than *O. waterhousei*, more darkly coloured, and with longer antennae and elytra.

In damp moss in a marshy place in company with *Calodera aethiops*, *C. riparia*, etc., at Yarnton, near Oxford, May 25th, 1924 (Donisthorpe).

Hygropora Kr., Ins. Deutschl., **2**, 132 (1858).

The genus *Hygropora* differs from *Oxypoda* on account of its very strongly contracted mentum, which is only slightly, abgestutytes, at the apex. Also by its more powerful maxillary palpi, and the somewhat long labial palpi, toothed at the apex.

Hygropora cunctans Er., Käf. Mark Brand., **1**, 349 (1839) [Walker, Ent. Mo. Mag., **50**, 194 (1914]. (Plate B, fig. 7.)

Very like an *Oxypoda* in aspect; very thickly and finely punctured, somewhat shining, with very fine short pubescence; black, or blackish-brown, the antennae, palpi and legs brownish-red, the femora often darker. Thorax strongly transverse, broadly elliptical, almost broader than the elytra, fully double as broad as long. Elytra longer than the thorax, not quite as long as together broad; abdomen narrowed to the apex. Long, 2.5—3 mm.

At the roots of herbage in damp places. Brockenhurst (Walker and Sharp); Shell Bay, near Studland (Harwood).

Meotica exillima Sharp, Ent. Mo. Mag., **51**, 205 (1915).

Narrow, subparallel, subopaque, antennae fuscous with the base, the palpi and legs testaceous; head and abdomen blackish, the latter lighter at the apex. Long 1¾ mm.

Readily distinguished from *M. exilis* by the narrow parallel form, the more obscure colour, and less shining surface; the antennae shorter and thicker, and the thorax longer. The eyes are very small; the thorax almost as long as broad, distinctly narrowed behind; elytra narrow, slightly longer than the thorax; abdomen elongate and parallel, the apex a little paler. Puncturation very indistinct, but more marked than in *exilis*. Wings short and rather broad, rather longer than the thorax and elytra, the portion beyond the stigma about as long as the basal section.

The insect varies a little in colour, and the male genitalia are peculiar.

In *Sphagnum*, Brockenhurst, spring and autumn (Sharp); Chobham and Windsor Forest (Donisthorpe), Shell Bay (Stott).

Meotica exilliformis Joy, Ent. Mo. Mag., **50**, 277 (1915) [Britten, Ent. Mo. Mag., **52**, 55 (1917)].

Resembles *M. exilis*, but is on the average slightly smaller, narrower and darker in colour; the head is less widened behind and the elytra are slightly longer and more strongly punctured; the aedeagus is bluntly pointed and simple at the apex. The head is at least pitchy-red and often pitchy-black, and the antennae are always fuscous towards the apex. Length 1.4-1.7 mm.

In flood refuse, River Kennet; also Wells, Chesham and Lundy Island (Joy); Oxford (Britten); Bricket Wood and Shell Bay (Williams).

In the Ent. Mo. Mag. for 1925, Index, p. xvi, this species is treated as a synonym of *M. exillima* Sharp, as is also the case in Winkler's Cat. Col. regionis palaearct, 437 (1925). Britten (l.c.) and others, however, regard it as a good species.

Phloeopora angustiformis Baudi, Berlin Ent. Zeits., 1869, 379 (**transita** Fowler, **nec** Muls et Rey). [Sharp, Ent. Mo. Mag., **35**, 106 (1919)].

This species comes very close to *P. reptans* Gr., from which it differs in its smaller size, narrower form and darker colour. The third joint of the maxillary palpi are brownish, the hind body quite black, scarcely lighter at the apex. The thorax is slightly narrower than the elytra, but distinctly broader than long, shagreaned and dull as in *reptans,* but the elytra are evidently less finely and less thickly punctured; they are also longer than in *reptans*. Length, 2.3-2.5 mm.

Under bark, Sherwood Forest (Sharp); Windsor Forest (Donisthorpe).

Phloeopora teres Gr., Col. Micr. Bruns., 79 (1802) [Donisthorpe, Ent. Rec., **37**, 166 (1925)]. (Plate , fig. 8.)

This species is very close to *P. corticalis* Gr., both having the head and thorax shining, which character separates them from the rest of the genus. It chiefly differs in having the fine hairs on the thorax directed from the apex to base throughout, whereas in *corticalis* they are directed outwards in part. It is also somewhat darker in colour. Long 2.5-2.7 mm. It is probably mixed with *corticalis* in collections, though both species are decidedly rare.

Under oak bark, Windsor Forest (Donisthorpe).

Ilyobates bennetti Donis., Ent. Rec., **26**, 137 (1914): Guests Brit. Ants, 76 (1927).

Brownish-red, elytra, apex of abdomen and base of segments, antennae, palpi and legs yellowish, pubescence yellow. Head coarsely punctured; antennae with the first joint thick, thicker than in *nigricollis*, second joint shorter, joints 4 to 10 transverse, eleventh longer than broad but shorter than in *nigricollis*; maxillary palpi with second joint very little longer than first, considerably thickened towards the apex, the whole being thicker and shorter than in *nigricollis*; labial palpi thicker and considerably shorter than in *nigricollis*. Thorax as coarsely punctured as head, transverse, not much narrower than elytra, shorter than in *nigricollis*, with sides less rounded and posterior angles sharper and more prominent. Elytra less coarsely punctured than head and thorax, about as broad as long, shorter and less coarsely punctured than in *nigricollis*, with humeral angles more prominent and less rounded, pubescence shorter and closer. Abdomen above duller, puncturation closer, at the base of the first four visible segments coarser and closer. Underside duller, puncturation coarser and closer, pubescence shorter and closer. Posterior femora somewhat bowed behind middle. Long 3 mm.

The thick and short palpi may suggest modification to suit a myrmecophilous life.

In company with *Acanthomyops fuliginosus*. Bexhill High Wood, 1907 (W. H. Bennett).

Calodera uliginosa Er., Käf. Mark Brand., **1,** 305 (1839) [Harwood and Williams, Ent. Mo. Mag., **64,** 5 (1928)].

Black, shining, antennae brown, legs dark brown with light knees. The last joint but one of the antennae almost quadrate. Thorax shining, rather widely punctured, with no trace of a central furrow. Long 3.5 mm.

This species is allied to *C. riparia* Er., but is considerably larger and more robust and of a deeper black colour, the basal joints of the antennae, knees and tarsi being lighter. In *riparia* the last joint but one of the antennae is transverse.

In flood-refuse from the banks of the River Stour, near Christchurch, Hants, October, 1925, also in 1926 and 1927 (P. Harwood and B. S. Williams).

Atemeles emarginatus Pk. var. **nigricollis** Kr., Naturg., Ins. Deutschl., **2,** 117 (1858) [Donisthorpe, Ent. Rec., **26,** 137 (1914): **33,** 22 (1921)].

In this variety the thorax is more or less blackish-brown, especially on the disc, and the elytra are yellowish-brown.

With *Myrmica laevinodis* Nyl. var. *ruginodo-laevinodis* For., at Countisbury, near Lynmouth, Devonshire, October, 1912 (H. Wallis Kew); with *Formica fusca* L., Box Hill, Surrey, May 4th, 1920 (Donisthorpe).

Atemeles paradoxus Gr. var. **acuticollis** Wasm., Deutsch. Ent. Zeit., **31,** 102 (1887) [Donisthorpe, Guests Brit. Ants, 224 (1927); Keys, Ent. Mo. Mag., **64,** 45 (1928)].

In this variety the sides of the thorax are more strongly bordered and the posterior angles distinctly more pointed and outstanding.

With *Formica fusca* L. var. *glebaria* Nyl., seven specimens at the Lizard, Cornwall, April 13th—19th, 1927 (J. H. Keys).

Atheta (Metaxya) vaga Heer, Faun. Col. Helvet, 341 (1839) (**melanocera** Th., **volans** Scriba) [**Homalota volans** Fowler, Col. Brit. Islands, **2,** 78 (1888). **Atheta melanocera** Joy, Ent. Mo. Mag., **49,** 57 (1913)].

In 1913 Dr. Joy introduced the *Atheta melanocera* Th. as new to the British list, but both this species and the *A. volans* Scriba are treated as synonyms of *A. vaga* Heer by Hinkler (1925). Fowler had already pointed out that *volans* was an extremely variable insect, and that Dr. Sharp had enumerated four varieties.

Joy describes *A. melanocera* as follows :—

Black, elytra sometimes pitchy-brown, apex of sixth free segment of hindbody sometimes yellowish, antennae black, first two joints pitchy, legs fuscous-

yellow, femora slightly darker; fore-parts rather dull, finely but distinctly shagreened; head much narrower than elytra; antennae with fourth and fifth joints elongate, penultimate joint quadrate or slightly transverse; thorax slightly narrower than elytra, rather strongly transverse, broadest close to anterior angles and very slightly contracted behind; elytra one and a third times longer than thorax; basal segments of hind body rather closely, apical segments diffusely punctured; median lobe of aedeagus with two right-angled bends and pointed at the apex. Length 3-3.5 mm.

Not common in the south of England, but very common in Scotland. This species may be recognised from its allies by its smaller head and darker legs.

Atheta (Metaxya) tomlini Joy, Ent. Mo. Mag., **49,** 58 (1913).

Smaller and lighter in colour than *A. melanocera*, first joint of antennae and legs light yellow; head larger than in *melanocera*; thorax rather strongly transverse, slightly narrower than elytra, and slightly contracted behind; median lobe of aedeagus with a single bend, the terminal portion long and not thickened towards apex. Length 2.4-2.8 mm.

Common in the south of England.

Atheta (Metayxa) malleus Joy, Ent. Mo. Mag., **49,** 58 (1913).

Very like *A. tomlini*, but on the average larger; thorax slightly narrower in proportion to elytra, and slightly less contracted behind than in *tomlini* and *melanocera*; median lobe of aedeagus with a single bend, the terminal portion short and distinctly dilated at apex. Length 2.6-3.2 mm.

England and Ireland, probably common. Harpenden, Hurn, Sherborne and Ampthill (Williams); Godalming (Stott); Windsor Forest (Donisthorpe).

Atheta (Metaxya) obtusangula Joy, Ent. Mo. Mag., **49,** 58 (1913).

As a rule rather lighter than *A. melanocera*; head larger; thorax only slightly transverse and more contracted behind; legs clear yellow; median lobe of aedeagus only slightly bent and larger and broader than in any of its allies. Length 3-3.5 mm.

This species is extremely like *A. elongatula*. Apart from the characters of the sixth free segment of the hind-body, it may be distinguished from the latter by its slightly narrower head, and by having the thorax a little more contracted behind.

South of England, rare. Ampthill and Lymington (Williams); Chobham (Donisthorpe); Studland (Stott).

Atheta (Hygroecia) subdebilis Joy, Ent. Mo. Mag., **61,** 219 (1925).

This insect is very closely related to *A. debilis* Er., but is on the average slightly narrower and the thorax a little more transverse; the eyes are smaller and less convex, and the temples are more evenly rounded. The aedeagus is also different.

In flood refuse, River Kennet, Theale, Berks, and River Loddon (Joy).

Atheta (Hygroecia) britteni Joy, Ent. Mo. Mag., **49,** 154 (1913).

Depressed, parallel-sided, very finely punctured and pubescent; head and hind-body, except apex, black, thorax pitchy or brown, elytra and apex of hind body yellowish, antennae yellow, slightly darker towards apex, palpi and legs yellow; head a little narrower than thorax, suborbicular; antennae with fourth and fith joints quadrate or slightly transverse, penultimate joints strongly transverse; thorax about as broad as elytra, transverse, not much narrowed behind, with a shallow longitudinal channel in the middle, very finely shagreened and punctured; elytra quadrate, about one-third longer than the thorax; hind body diffusely punctured, fourth and fifth free segments almost impunctate; ♂ with ventral plate of fifth segment projecting some distance beyond the dorsal plate. Long 2.2-2.5 mm.

This species much resembles *A. debilis* Er., but is considerably smaller, the thorax not being nearly so much contracted behind and having the sides very slightly and evenly rounded, instead of being almost sinuate in the middle as in *debilis.*

In flood refuse, Langwathly, Cumberland, May 5th, 1911 (Britten); Bubwith, Yorks (Fordham).

Atheta (Hygroecia) hygrobia Th. (**nec** Muls. et Rey) Oefvers Vet. Acad. Förhandl., 1856, 93 (**magniceps** Sahlb.) [**Atheta magniceps** Joy, Ent. Mo. Mag., **49,** 77 (1913)].

Subparallel, very finely punctured; head black, thorax pitchy-brown, elytra brown or yellowish-brown, hind body black with apex yellowish, antennae fuscous with base yellow, legs yellow; head large, nearly as broad as thorax; antennae slightly thickened towards apex, fourth and fifth joints subquadrate, penultimate joints moderately transverse; thorax slightly narrower than elytra, moderately transverse, distinctly contracted behind; elytra together quadrate or slightly transverse; hind body with basal segments closely and apical segments very diffusely punctured; ♂ with under plate of sixth free segment of hind-body rounded and scarcely projecting beyond the upper plate; ♀ with the under plate bluntly angled in the centre, and with the hind margin set with fine hairs. Length 2.2-2.5 mm.

In flood refuse from the River Truim, Dalwhinnie, Inverness-shire, October, 1909 and 1910 (Joy); Bricket Wood, St. Alban's (Williams).

Atheta (Dralica) rigua Williams, Ent. Mo. Mag., **65,** 52 (1929).

Narrow, subparallel, subdepressed, moderately shining, pitchy-black; apex of abdomen lighter, thorax and elytra brown, antennae reddish-testaceous, maxillary palpi and legs testaceous.

Head black, oval, moderately transverse, very finely and somewhat diffusely punctured and pubescent, centre of the disc with a circular depression. Temples margined, their length when viewed from above exceeding somewhat that of the eyes, which are slightly prominent. Antennae slender, reaching beyond base of thorax, gradually and feebly thickened from base to apex, joints 1-3 elongate, 1 slightly longer and thicker than 2, 2 and 3 subequal, 4 feebly transverse, 5-10 equal in length, gradually increasing in width, 9 and 10 about one and a half times as broad as long, 11 pointed, as long as 9 and 10 together. Thorax trans-

verse, almost one and a third times as broad as long, as wide and as long as head, finely and closely sculptured and pubescent, median line very obsolete and scarcely indicated, the disposition of the minute asperities confused. Elytra slightly broader and about one and a third times as long as thorax, one and a quarter times as broad as long, closely pubescent, sculpture as in thorax but the asperities coarser and arranged in irregular transverse rows. Hind-body subparallel, much more diffusely sculptured and pubescent than elytra, the first three free tergites more closely sculptured and pubescent than the apical ones. Length 1.7-1.8 mm. ♂ with sixth free tergite simple, the sixth sternite rounded and produced. ♀ with the sixth free tergite simple, the sixth free sternite with a narrow triangular excision in the middle of the apical edge.

A. rigua comes very close to *A. vilis* Er., but is smaller, with shorter and more slender antennae, narrower thorax, finer sculpture and shorter legs. The aedeagi and spermathecae are also different.

In swamps, Hurn, Hants; Earith, Cambs; St. Alban's, Herts (Williams).

Probably mixed with *A. vilis* in collections.

Atheta (Microdota) ellimani Bernh., Münchner Koleopt. Zeits., 4, 38 (1909).

This species comes next to *Atheta insignicollis* Fauv., but is easily known from it by its smaller and much narrower shape, much finer and closer puncturation of the thorax and elytra, and much longer elytra.

Generally very like a small *Bessopora*, although the transverse impression at the base of the fourth visible segment of the abdomen is not strongly enough developed to justify its inclusion in that subgenus. The body is narrower, somewhat depressed, and of an equal breadth, deep black, somewhat shining, with only the legs pitchy-brown; head very little narrower than the thorax, transverse, with a furrow in the centre, finely and distinctly, but less densely, punctured. The antennae slightly thickened towards the apex, entirely deep black, the third joint much shorter than the second, the following joints slightly, the last but one moderately transverse, about half as broad again as long, the last joint scarcely as long as the two previous ones taken together. The thorax slightly narrower than the elytra, not quite half as broad again as long, smooth at the sides, uniformly rounded, with an indistinct impression before the scutellum, not too finely but very distinctly and moderately closely punctured. Elytra nearly half as long again as the thorax, together a little longer than broad, similarly to the thorax but a little more finely punctured. Hind-body parallel-sided, finely and not closely, and behind sparsely punctured. Long 2.5 mm.

Carlisle, in carrion (Elliman).

CORRECTION.

On p. 238, the last paragraph should read :—'The genus *Hygropora* differs from *Oxypoda* on account of its very strongly contracted mentum, which is only narrowly truncate at the apex; also in its more powerful mandibles and the lobes of the maxillae being furnished towards the apex with moderately long teeth.'

(To be continued.)

AESCHNA COERULEA Ström, AT RANNOCH.

BY KENNETH J. MORTON, F.E.S.

It was in the early part of June, 1865, that Rannoch was invaded by a famous entomological triumvirate, Messrs. McLachlan, Rye and Sharp. They took up their quarters at Camghouran, where they were received with much goodwill, but judging from their accounts they seem hardly to have lived on the fat of the land. On that occasion McLachlan secured, amongst other interesting species, three examples of *Aeschna coerulea* Ström (*borealis* Zett.) on the steep fern-covered face of rocky hills where their capture was most difficult; they never appeared to frequent the flat ground or moors (E.M.M., II, p. 117, 1865). Although an earlier example, stated to have been taken in the north of Scotland and given to de Selys by a Mr. Wilson of Edinburgh, may quite possibly have been from Rannoch, Mr. McLachlan's was the first definite record of *Ae. coerulea* from this now well-known locality. Twenty-four years later, on 15th June, 1889, my friend King and I set out in order to find it again if we could, and we did (E.M.M., XXV, p. 383, XXVII, pp. 45-47). In June, 1898, a strong contingent, consisting of Messrs. Porritt, Briggs and King, whom I also joined for a few days, sojourned for a fortnight at Camghouran, and collected the species with great success. Mr. Porritt's account of this expedition will be found in the 'Entomologist' for 1899 (pp. 86-91). In the meantime I had found it in some numbers in another Perthshire locality, Glen Lochay, and since then King has recorded it from Strathglass and Glen Affrick, Inverness-shire, and in Ross-shire, and Col. Yerbury took it at Invershin, in Sutherland. In July, 1915 and 1916, and on the first days of August, 1917, it was taken by myself commonly at Inverlair, Inverness-shire; and at the end of July, 1917, I had the pleasure of finding it flying near one of the burns in the narrow divide between the waters of Loch Laggan and the Spey, so that it is difficult to say from which of the two valleys the insects originated. I do not think that I have recorded this locality before. Lastly, at the beginning of August, 1922, I saw a single specimen in the Loch Awe district, Argyllshire. In Arctic Europe and the Alps this species reaches the extreme limits at which dragon-flies exist permanently, its closest associates in this respect being *Somatochlora alpestris*, *S. arctica* and probably *Enallagma cyathigerum*.

A wish to see *Ae. coerulea* again led to a rather sudden decision to revisit Rannoch, and my wife and I arrived there on 12th June, just forty years after my 1889 excursion with King. Our

intention was to remain for a week only, but as my son was able to join us for a few days' fishing, we extended our stay to the 24th, and what success we had was in our second week. On the present occasion we lived at Invercomrie, a short distance west of the Bridge of Gaur, and thus nearer the great moor. This grand river, the Gaur, brings down the waters from the Moor of Rannoch, one of the chief of its ultimate sources being the River Bà, which rises in the dark Corrie Bà, the sanctuary of the wild life of the Black Mount forest lying west of the road between Glen Orchy and Ballachulish. At the highest point of this road *Erebia epiphron* may be found just a little above the road which may be regarded as the western boundary of the Moor, and from which, perhaps, the best idea may be obtained of this wilderness of rock, peat and water. The late Sir John Murray and others surveyed the Rannoch Moor Lochs in 1902, and in the relative report it is stated that in rainy weather a large amount of water passes down the River Bà and other streams into the Moor of Rannoch, and about a mile or two to the eastward of the road a large extent of the Moor is flooded, and presents the appearance of a vast lake. In drier weather there are distinct basins which have received names, the largest of these being Loch Bà. I have only seen this area in the latter condition. The river Bà finally discharges into Loch Laidon, out of which issues the Gaur. My belief is that the principal breeding-places of *Ae. coerulea* in Rannoch are in the Great Moor itself and the less extensive moors lying to the south of the Black Wood, not in the lochs or lochans, but in the stagnant waters of the peat-bogs; the presence of the dragon-flies on the rough bracken-covered lower slopes of the hills or in the glades and open places in the woods being but one phase in the life of the imago as I have already suggested elsewhere (Ann. Scott. Nat. Hist., 1899, pp. 26-29). There were certainly no breeding-places in the wood beyond Invercomrie, where the species was abundant.

At Invercomrie we were beyond the more favoured parts of Rannoch. The situation is more open and little wooded. The weather, too, was a great contrast to that experienced in 1889. Strong westerly and north-westerly winds prevailed all the time; it was never really warm, most days were showery, one or two decidedly wet. The first dragon-flies were seen on the 14th, when *Pyrrhosoma nymphula* was taken at small moor streams, and on the same day the first *Ae. coerulea* was flushed from the heather on the side of a low hill in open moorland. On the 17th, one of

our finest days, we visited the Black Wood, our only visit, a second one which we had arranged being put off by unpromising weather. Insects generally seemed to be scarce, but our first *Ae. coerulea,* a ♂, was taken, the only other dragon-fly present being *P. nymphula.* About a mile and a half westward of the Bridge of Gaur, on the south side of the river, there is a moderate extent of birch wood, which lies about mid-way between the Allt Chomrie and the Allt Dubh. Working around the sheltered side on the 18th, Miss Ethel Evans, who was with us at the time, directed me to a dragon-fly which she had marked down and which I was able to secure. It proved to be a fairly mature ♂ of *Somatchlora arctica.* Continuing westward, we found several *Ae. coerulea* amongst scattered birches; as the gleams of sunshine were of short duration and the insects shy, we failed to take any. *P. nymphula* was again common. The 19th was rainy all day. On the 20th I followed upwards the course of a little burn which runs through the middle of the birch wood, and in a sheltered corner found *Ae. coerulea* in numbers, taking four ♂ and four ♀ in quite a short time, perhaps as many more being seen. On the following days at the same spot I had no difficulty in increasing my captures to a good series, the sexes being in about equal numbers. It was a most interesting sight to note on more than one occasion as many as five or six specimens resting on a fallen birch trunk or a big granite boulder from which they made short darting flights after insects, their prey apparently being mostly Lepidoptera. They also showed their well-known habit of flying to the white net, although they frequently were prudent enough to settle on the outside of it, and thus evade capture. *Cordulegaster annulatus* was first observed by my son when fishing in the Allt Chomris on the 20th; on the following day I picked up exuviae at the same burn. On 23rd at the upper part of the birch wood I saw a single *Libellula quadrimaculata,* and on the east side of the wood on the afternoon of the same day during an unusual spell of sunshine, obtained a fine ♂ *C. annulatus* and a good ♀ *S. arctica,* while a search at a small runnel in the adjoining boggy ground was rewarded by the discovery of two exuviae of the latter species. *Leucorrhinia dubia* was not seen at all; it seemed quite useless to work for it at the pools in the open moor with a strong and coldish wind constantly blowing. The season was obviously a late one; with the exception of *Ae. coerulea* and *P. nymphula,* dragon-flies were evidently just beginning to come out. Of butterflies, the only species at all common was *Coenonympha pamphilus*;

a few *C. typhon* were noted towards the end of our stay and a single *Aglais urticae*. *Brenthis euphrosyne* and *Callophrys rubi*, usually in evidence in the Black Wood, were not observed on our one visit.

Trichoptera were decidedly scarce and late. The only species calling for special mention was *Stenophylax infumatus*, which was described by McLachlan from his Rannoch captures of 1865; by persistent searching a fair series was collected. Of the genus *Sialis*, only two *S. fuliginosa* were seen. A number of Hemerobiids and Plecoptera not yet examined fully, seem to comprise only well-known species.

While for several reasons the results of our visit may have fallen short of expectations, yet the attractions of Rannoch with the Black Wood and all the rest never pall. The district recovered easily from the temporary disturbance caused by the making of the West Highland Railway, which did not exist when I went there first. Extensive work is now in progress in connection with the utilization of the waters of Loch Ericht for power. Perhaps there is no real danger of the glories of Rannoch being tarnished by industrialism, although naturally one may feel a little uneasy about such activities in what would be, and at present in many ways is, an ideal reserve for wild life.

13 Blackford Road, Edinburgh.
September, 1929.

THE JAMES EDWARDS COLLECTION OF BRITISH HOMOPTERA, WITH NOTES ON CERTAIN GENERA AND SPECIES.

BY W. E. CHINA, B.A.

(*Concluded from p.* 230.)

58. *Typhlocyba complicata* Edw. (*Anomia*), Ent. Mo. Mag., 1928, p. 80.

    Type :—Male, ex horse-chestnut, Colesborne, Gloucester, 10. VIII. 1922.

59. *Typhlocyba prunicola* Edw., Ent. Mo. Mag., 1914, p. 168.

    Type :—Male, with dissected genitalia, ex garden plum, Sherwood, Notts. (Carr), 17. VII. 1913.

    Paratypes :—Specimens with same data; also from Nottingham, ex plum (Carr), 17. VII. 1913.

    Additional county record :—Gloucester.

60. *Typhlocyba carri* Edw., Ent. Mo. Mag., 1914, p. 170.

    Type :—Male, with dissected genitalia, from Edwinstowe, Sherwood Forest, Notts., 30. VIII. 1912 (Carr).

Paratypes :—One male on oak at Arnold, Notts., 13.VIIII. .1913 (Carr).

Additional county record :—Gloucester.

61. *Typhlocyba plebeja* Edw., Ent. Mo. Mag., 1914, p. 169.

Type :—Male, with dissected genitalia, ex alder, Bulwell Forest, 21.VII.1913 (Carr).

Paratypes :—Specimens labelled oak or lime, Arnold, Notts., 24.VII (Carr); oak, Fiskerton, Notts., 25.VII (Carr); elm or hazel, Epperstone Park, Notts., 16.IX (Carr).

62. *Typhlocyba diversa* Edw., Ent. Mo. Mag., 1914, p. 171.

Type :—Male, with dissected genitalia, from Aspley Woods, Notts., 4.VII.1912 (Carr).

Paratypes :— Specimens with same data.

Additional county record :—Gloucester.

63. *Typhlocyba distincta* Edw., Ent. Mo. Mag., 1914, p. 170.

Type :—Male, with dissected genitalia, from Aspley Woods, Notts. (Carr).

Paratypes :—Specimens with same data.

Additional county record :—Gloucester.

64. *Typhlocyba bidentata* Edw., Ent. Mo. Mag., p. 170.

Type :—Male, with dissected genitaila, ex hazel, from Colesborne, Gloucester, 15.X.1913.

65. *Typhlocyba tersa* Edw., Ent. Mo. Mag., 1914, p. 169.

Type :—Male, with dissected genitalia, ex willow, from Berkdale, 1911 (Whittaker).

Additional county records :—Derby and Norfolk.

66. *Erythroneura concinna* Edw. (*Zygina*), Ent. Mo. Mag., 1924, p. 56.

Type :—Male, from Hadleigh, Essex, 1906 (Butler).

Paratypes :—Specimens from Colesborne, Gloucester, dated 6.XI.1907, 30.IX.1921 and 4.X.1921 (Edwards).

67. *Erythroneura neglecta* Edw. (*Zygina*), Ent. Mo. Mag., 1914, p. 171.

No definite locality was given in the original description. A male from Colesborne, Gloucester, 7.IV.1914 (Edwards), has been fixed as type.

68. *Erythroneura neglecta* Edw. ab. *rubrinervis* Edw.

Type :—Male, from Colesborne, 7.IV.1914.

69. *Erythroneura mali* Edw. (*Zygina*), Ent. Mo. Mag., 1915, p. 209.

Type :—Male, with dissected genitalia, ex apple, from Colesborne, Gloucester, 3.X.1913.

Paratypes :—Specimens with same data, also dated 18.x.1913.

70. *Erythroneura pruni* Edw. (*Zygina*), Ent. Mo. Mag., 1924, p. 56.

Type :—Male, from Norwich, Norfolk, ex cherry, 24.VIII.1909.

Paratypes :—Specimens with same data, also ex sloe, Colesborne, Gloucester, 26.IX.1922.

71. *Erythroneura pallidifrons* Edw. (*Zygina*), Ent. Mo. Mag., 1924, p. 57.

Type :—Male, ex foxglove, Tintagel, Cornwall, VIII.1908 (Butler).

Paratypes :—Specimens with same data.

FULGORIDAE.

72. *Cixius scotti* Edw., Ent. Mo. Mag., 25, 1888, p. 100.

This species was incorrectly determined by Scott as *C. simplex* H.S.

Type in Dublin Museum.

73. *Cixius remotus* Edw., Ent. Mo. Mag., 25, 1888, p. 100.

This species was incrrectly determined by Scott as *C. similis* Kbm.

Type in Dublin Museum.

74. *Megamelus thoulessi* Edw. (*Liburnia*), Hem.-Hom. Brit. Is., 1896, p. 39.

Type in Dublin Museum.

75. *Chloriona dorsata* Edw., Ent. Mo. Mag., 1898, p. 59.

Described from two males from Haute Savoie, France (Autran). These specimens are not in the Edwards Collection. The type is apparently either in the Autran Collection or in the Dublin Museum.

British specimens collected by Butler are in the Brit. Mus.

76. *Liburnia similis* Kbm.

Not represented.

77. *Liburnia pullula* Boh.

Not represented.

78. *Liburnia obscurella* Boh.

Not represented.

79. *Liburnia insignis* Scott.

Not represented.

80. *Liburnia difficilis* Edw., Ent. Mo. Mag., 1888, p. 197.

No locality was mentioned in the original description, but there are no specimens in the Collection collected prior to 1888. The type is probably in the Dublin Museum.

81. *Liburnia discreta* Edw., Ent. Mo. Mag., 1888, p. 197.
No locality was mentioned in the original description, but in Hem.-Hom. Brit. Is., 1896, Edwards gives Glanvilles Wootton (Dale). There are no specimens collected prior to 1888 in Edwards' Collection. The type is therefore probably the specimen collected by Dale and may be either in Dale's Collection or in the Dublin Museum.

82. *Liburnia flaveola* Flor.
Not represented.

83. *Liburnia sordidula* Stål.
Not represented.

PSYLLIDAE.

84. *Aphalara artemisiae* Först.
Not represented.

85. *Psyllopsis distinguenda* Edw., Ent. Mo. Mag., 1913, p. 251.
Type:—One of the five specimens collected by Champion in the New Forest, 21.VI.1913, has been selected as type, the rest become paratypes.

86. *Psylla concinna* Edw., Hem.-Hom. Brit. Is., 1896, p. 237.
Described from a single male collected by Dale in Dorsetshire. This species is not represented in Edwards' Collection, and the type is either in Dale's Collection or in the Dublin Museum.

87. *Psylla löwii* Scott.
Not represented.

88. *Psylla subferruginea* Edw., Ent. Mo. Mag., 1915, p. 210.
No definite locality given in original description.
Type:—Male, with dissected genitalia, from Colesborne, Gloucester, 9.IV.1914.

89. *Psylla brunneipennis* Edw., Hem.-Hom. Brit. Is., 1896, p. 238.
Type:—In Dublin Museum.

90. *Psylla venata* Edw., Hem.-Hom. Brit. Is., 1896, p. 242.
Type:—In Dublin Museum.
According to labels in Edwards' Collection, this species is synonymous with *P. hartigii* Flor.

91. *Trioza proxima* Flor.
Not represented.

92. *Trioza centranthi* Vall.
Not represented.

93. *Trioza prasina* Flor.
Not represented.

94. *Trioza silacea* M.-Dur.
Not represented.
95. *Trioza viridula* Zett.
Not represented.
96. *Trioza salvicivora* Reut.
Not represented.
97. *Trioza saundersi* M.-Dur.
Not represented.
98. *Trioza munda* Först.
Not represented.
99. *Trioza abdominalis* Flor.
Not represented.

In his Catalogue (label list) of British Homoptera, published in August, 1908, Edwards listed 347 species. Since that time, in various papers published in the Ent. Mo. Mag., he has added 64 species to the list. In addition to these, two species were added by Laing in 1920, while in this paper two further species, *Ophiola corniculatus* Marsh (revived from synonymy) and *Cicadula laevis* Ribaut, determined by Edwards, are added. A series of *Idiocerus rutilans* Kbm., 'a species new to Britain,' was exhibited by Mr. W. West at a meeting of the South London Entomological Society on November 26th, 1908 (*cf.* Ent. Mo. Mag., Vol. XLV, p. 21). This makes a list of 415 British species, but from these must be deducted the following species :—*

1. *Idiocerus viduatus* Edw. = female var. of *I. elegans* Flor.
2. *Recilia coroniceps* Kbm. = *R. coronifer* Marsh,
3. *Deltocephalus repletus* Edw. nec Fieb. = *distinguendus* Flor.
4. *Deltocephalus falleni* Edw. nec Fieb. = *distinguendus* Flor.
5. *Dikraneura pygmaea* Dougl. = male of *Zygina hyperici* H.S.
6. *Liburnia melanopachys* Scott = *L. venosa* Germ.
7. *Psylla venata* Edw. = *Psylla hartegii* Flor.

This leaves a total of 408 species, of which 22 are not represented in the Edwards' Collection. Some of these, however, are to be found in the Douglas, Scott and Norman Collections in the British Museum.

* It is also probable that *Cicadula frontalis* Scott is synonymous with *C. variata* Fall.

British Museum (Natural History).
London, S.W.7.

TWO NEW BRITISH MAYFLIES (EPHEMEROPTERA).

BY K. G. BLAIR, B.SC., F.E.S.

The two species now described as new have each been known to me for some time in single ♂ examples, and having tried in vain to secure further material, either myself or from their respective captors, I now describe them in the hope that other collectors may discover them among their unnamed material.

1. **Rhithrogena fradgleyi** sp. nov. (Fig. 1.)

♂ (dry). Thorax pitchy-brown, abdomen a little lighter, posterior margins of segments narrowly pale, venter similarly coloured; forceps-base brown, darker at sides, posterior margin with a sharp median excision; forceps black. Wings hyaline, faintly suffused with brown towards base and in costal area; veins brown, cross-veins darker. Fore-legs dark brown, with tarsi blackish, middle and hind-legs paler, femora with a blackish mark about middle; setae smoky. Tarsus of fore-leg about twice as long as tibia, the joints in the following proportions :—1 : 4 : 3.5 : 3 : (wanting). Dimensions :—Body 11 mm.; wing 13.5 mm.; fore-leg 11.1 mm.; seta 20 mm. (circa).

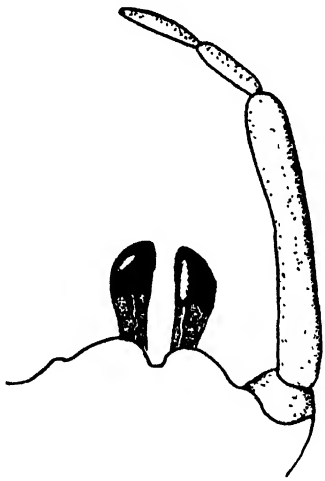


Fig. 1.—Genitalia of *Rhithrogena fradgleyi* sp. n.

One ♂ taken by Mr. K. F. Fradgley on the River Exe or Otter, but exact locality or date not known as the specimen was not recognised as different from *E. venosus* until some time after capture.

Bears a superficial resemblance to *Ecdyonurus venosus*, with a number of which species it was sent. It was at first assumed to be *R. germanica* Eat., but as the genitalia, though apparently very similar, did not quite agree with the figures either of Eaton (1) or of Klapálek (2) the accompanying drawing was sent to Dr. Georg Ulmer for confirmation. By him it was pronounced to be not *R. germanica*, of which the figure given by Klapálek is stated

to be correct, but as very close to the Danish *R. ussingi* Esb. Peters. (4). From the description of the latter and the figure of the genitalia it seems impossible that the two can be identical, and I have no choice but to describe this species as new.

Haplogenia gen. nov. (*Ecdyonuridarum*).

VENATION (fig. 2) nearly as in *Epeorus* (Eaton, Pl. xxiii, fig. 44), but with the following differences :—*Fore-wing* : union of 4 and 5 (of R2 and R3) markedly more distant from base than fork of 7 (M.). *Hind-wing* : union of 3 and 5 (of R and Rs) also relatively more distant from base, while 5 (R5) is unforked.

In both wings the cross-veins are more numerous, very few cells being at all elongate.

LEGS (fig. 3). Femur and tibia of fore-leg (♂) subequal, rather longer than the first two tarsal joints; first four tarsal joints subequal, about twice as long as the 5th; claws dissimilar, one with a sharp apical hook, the other bluntly rounded.

GENITALIA (figs. 4). Penis lobes adjacent, evenly expanded towards apex, provided with a long spine on each side at base.

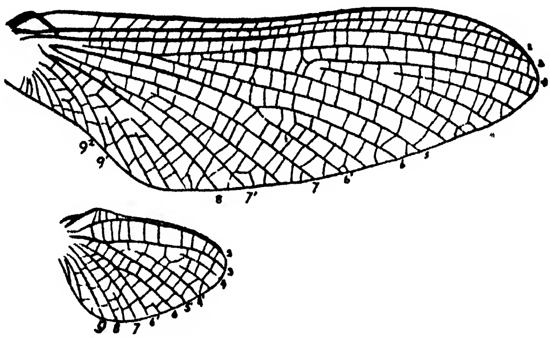


Fig. 2.—Wings of *Haplogenia southi* sp. n.

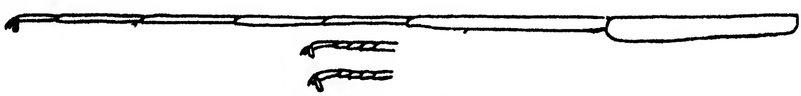


Fig. 3.—Legs of *Haplogenia southi* sp. n. ♂.

Allied to *Ecdyonurus* Eat. but differing from any genus of Eaton's Revisional Monograph in the venational characters cited. It is probably closely allied to *Arthroplea* Bengtss. (3), in which vein 5 of the hind wings is unforked (fide Bengtsson *in litt.*), but in this genus, *inter alia*, the forks of 4- 5 and 7 of the fore wing are subequidistant from the base. The generic name has reference to the simple condition of vein 5 of the hind wings.

2. **Haplogenia southi** sp. n.

♂ (dry). Thorax dark piceous, lighter on sides and above wing-bases; abdomen brownish-piceous with faint aeneous reflections, each segment bordered laterally and posteriorly with paler; segments 2 to 8 each with a pair of rather deep foveae placed like a colon (:) on each side of the median line; basally these foveae are before the middle of the segment, but posteriorly they become shifted rather farther back; venter paler than the dorsum, each segment pale behind, widely in the midlde but narrowly near the sides; forceps base entirely dark. Wings slightly infuscate in basal half. Fore-leg dark brown, tarsi paler, middle and posterior legs brown. Setae (incomplete) smoky, with joints darker; basal segments elongate.

Dimensions: Body 11 mm.; wing 11.5 mm., fore-leg 10 mm.

Locality: Middlesex, Stanmore, 4.vi.1920 (1 ♂, R. South.).

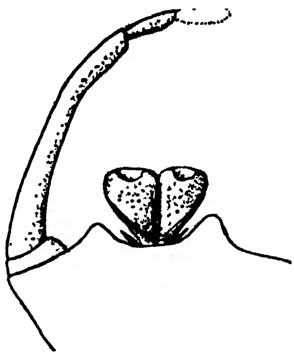


Fig. 4.—Genitalia of *Haplogenia southi* sp. n

The unique type is in a rather fragile state owing to the depredations of Psocids, but is very different from any species known to me. Brief descriptions or figures have been referred to Prof. Bengtsson and Dr. G. Ulmer for determination, but the species is apparently unknown to either.

The types of both species have been kindly presented by their captors and placed in the National Collection.

REFERENCES.

1. EATON, REV. A. E., Revisional Monograph of Recent Ephemeridae or May-flies. Trans. Linn. Soc. (2) III, Zool., 1883—1888.
2. KLAPALEK, F., Süsswasserfauna Deutschlands, Heft 8, 1909.
3. BENGTSSON, S., Beitr. zur Kentn. der Palaearkt. Ephem. Acta Univ. Lund, V. 1909.
4. PETERSEN, ESBEN, Entom. Meddelelser (2) iii, 1910, p. 313.
5. TILLYARD, R. J., The Wing-Venation of the Order Plectoptera or Mayflies. Linn. Soc. Jnl. Zool., xxxv.1923, pp. 143-162.

120 Sunningfields Road, Hendon.
1st October, 1929.

UNISEXUAL FAMILIES IN *RHABDOPHAGA HETEROBIA* H.Lw. (CECIDOMYIDAE, DIPTERA).

BY H. F. BARNES, B.A., PH.D.
(Entomology Dept., Rothamsted Experimental Station.)

The following facts concerning unisexual families in insects came to light in a series of breeding experiments carried on at Rothamsted during the summer of 1929. It was not until October of the same year that the author became aware of the work of Dr. Metz on various species of *Sciara*, through Dr. R. A. Fisher, who very kindly drew his attention to it.

Rhabdophaga heterobia H. Lw. is the common button-top midge of osier willows. It has been shown* that the larvae of this species of gall midge cause three types of galls: (1) button top galls, when the terminal growing points are attacked, (2) bud galls, when the lateral overwintering buds are attacked, and (3) catkin galls, when either spring or summer catkins are attacked.

In the series of experiments under consideration stock was obtained by collecting button galls and bud galls from a commercial osier bed near Syston, Leicestershire, in November of the previous year. The experiments consisted of mating single virgin males and females, and rearing the progeny on separate osier plants (two year old stubs of Black Maul variety).

In two such matings (experiments A and B) of midges reared from bud galls the resulting progeny made typical button galls. This was to be expected, as in May, when the experiments started, osiers do not carry any buds that will overwinter. The progeny of both these matings consisted entirely of males. In a third experiment (C) when a male from a bud gall was mated to a female from a button gall, again typical button galls resulted, and the progeny was entirely male. In the fourth experiment (D) a male from a button gall was mated to a female from a bud gall. Here again typical button galls resulted, but this time the progeny was entirely female.

In the second series of the experiments, males descended from the third of the above series (C) were used in each case; in three instances (E, F, G) females were used from the progeny of experiment D, and in the fourth case (H) a female bred from the original bud gall material was used. The resulting progeny in experiments E and G consisted of females alone, while experiment F produced only males. In experiment H only males were produced.

In the third series of experiments it was suggested by Dr.

* Barnes, H. F. Jl. Min Agr., 36, 65-72, 1929.

Fisher and Dr. Imms that it would be advisable to determine which sex carried the factor deciding the sex ratio. Consequently in experiment I a male from progeny H was mated successively to two females from progeny E; in experiment J a male from progeny F was mated to two females from progeny G and two females from progeny E; in experiment K a male from progeny H was mated to four females from progeny E and two females from progeny G. In these cases the fertilised females were isolated on separate Black Maul plants, and button galls resulted. Unfortunately the plants all died off in late August, and there is little hope of rearing any adults in 1930 from these galls.

It is proposed in 1930 to set up experiments to see whether unisexual progeny midges are the rule or otherwise in this midge, and also to ascertain whether the female carries the determining factor, as has been shown to be the case in *Sciara* species by Metz and Moses.

The only conclusion that can be drawn from the 1929 experiments is that unisexual families do occur in *Rhabdophaga heterobia* H. Lw., a Cecidomyid Dipteron.

REFERENCES.

METZ, C. W. Chromosomes and sex in *Sciara* (Diptera). *Science*, 61, 212-4, 1925.

——— Chromosome studies in *Sciara* (Diptera), I. Differences between the Chromosomes of the two sexes. *Amer. Nat.*, 60, 42-56, 1926.

METZ, C. W., MOSES, M. S., HOPPE, E. N. Chromosome behaviour and genetic behaviour in *Sciara* (Diptera), I. Chromosome behaviour in the spermatocyte divisions. *Zeitschr. f. ind. Abst. u. Vererb.*, 42, 237-70, 1926.

METZ, C. W. Chromosome behaviour and genetic behaviour in *Sciara* (Diptera), II. Genetic evidence of selective segregation in *S. coprophila*. III. Absence of parthenogenesis in *S. coprophila*. *Zeitschr. f. ind. Abst. u. Vererb.*, 45, 184-201, 1927.

——— Genetic evidence of a selective segregation of Chromosomes in a second species of *Sciara* (Diptera). *Proc. Nat. Acad. Sci.* 14, 140-1, 1928.

MOSES, M.S., METZ, C. W. Evidence that the female is responsible for the sex ratio in *Sciara* (Diptera), *loc. cit.*, 14, 928-30, 1928

METZ, C. W., MOSES, M. S. Observations on sex-ratio determination in *Sciara* (Diptera), *loc. cit.* 14, 930-2, 1928.

METZ, C. W., ULLIAN, S. S. Genetic identification of the sex chromosomes in *Sciara* (Diptera), *loc. cit.* 15, 82-5, 1929.

METZ, C. W. Selective segregation of chromosomes in males of a third species of *Sciara*, *loc. cit.*, 15, 339-43, 1929.

——— Evidence that 'unisexual' progenies in *Sciara* are due to selective elimination of gametes (sperms). *Amer. Nat.*, 63, 214-28, 1929.

Rothamsted.

October 16th, 1929.

FURTHER REMARKS ON EMBIOPTERA FROM BAGHDAD.

BY P. ESBEN-PETERSEN.

In my paper entitled 'Embioptera from Baghdad' (Ent. Mo. Mag., Jan. 1929, pp. 7-9), I described two species, and gave figures of the anal appendages of the male of both. I referred one to *Embia persica* McLachlan, and described the other as new under the name *Oligotoma mesopotamica*. In an introductory note to the paper Dr. Hugh Scott, who collected the material of both species, recorded some details as to their occurrence. In Ent. Mo. Mag., Feb. 1929, p. 43, Mr. K. J. Morton recalled that Embioptera of two species had been collected in Mesopotamia by Mr. W. Edgar Evans, and that they were dealt with by Professor Silvestri (Trans. Ent. Soc. London, 1923, pp. 261-2), who also referred one to *Embia persica* McLachlan, but determined the other as *Oligotoma nigra* Hagen.

In the 'Collections Zoologiques du Baron de Selys-Longchamps,' Embiidinen, p. 86, 1912, Dr. G. Enderlein described a male example of *Oligotoma nigra* Hagen and figured its anal appendages. I suppose the example described to be Hagen's type-male from Egypt. My species *Oligotoma mesopotamica* is undoubtedly different from *O. nigra* as described by Enderlein, both in the shape of the anal appendages of the male and in the venation of the wings.

That the insects referred by me and by Silvestri to *E. persica* are one and the same species is quite clear, though whether it is the true *E. persica* of McLachlan can only be settled by examination of the type-material in McLachlan's collection. But I cannot agree with Professor Silvestri in regarding the Mesopotamian species as a variety of *E. savignyi* Westwood, described from Egypt.

Silkeborg, Denmark.
September 28th, 1929.

The New Forest as a Nature Reserve.—(The following communication from the Secretary of the Entomological Society of Hampshire will not fail to appeal to Entomologists in general, and more especially to those whose good fortune it is to know and appreciate the beauty and interest of the finest and most extensive self-contained tract of natural forest ground still left to us in the British Islands. In view of the vastly increased traffic through the Forest, and the deterioration of some of its choicest portions, mainly due to the loss of so many fine trees by felling and natural decay, it may well be desired that most, if not all, of the recommendations of this active local Society may be made effective in the near future.—EDS.)

Copy of Resolution passed at Meeting of the Entomological Society of Hampshire held in Southampton 28th September, 1929.

RESOLVED that inasmuch as the rapid development of rural districts is seriously restricting the area available in England for the preservation of the natural Flora and Fauna of the Country, which are in consequence in danger of extinction, the New Forest ought so far as possible to be treated as a Nature Reserve; and that inasmuch as the main object of a Nature Reserve is the preservation of all objects of wild nature and especially of the indigenous Flora and Fauna, this Meeting views with concern the continued deterioration of the New Forest as a natural woodland, and recommends that—

(1) So far as is compatible with the strictly legal rights of the Commoners the whole Forest be maintained as a Nature Reserve.

(2) New rights should on no account be granted, and the extension of, or excessive exercise of, existing rights should be rigorously guarded against.

(3) As burning and drainage are incompatible with a Nature Reserve, no further burning and drainage should be undertaken.

(4) The closed blocks be kept effectively closed, so as to prevent the trespass of animals, except in so far as, preliminary to regeneration, the trampling of animals may be considered by the Forestry Commissioners desirable.

(5) As the natural spread of any indigenous tree is not incompatible with rights of common, such spread should not be prevented.

(6) No new macadamised roads should be constructed.

(7) The management of the enclosed blocks be continued on the lines recently adopted by the Forestry Commissioners and the Advisory Committee, especial regard being paid to the reproduction of broad-leaved species where these are likely to thrive in preference to conifers.

(8) The attention of the Commissioners be called to the rapid and progressive decay of the unenclosed old woods, and the regeneration of the yet open Forest should be undertaken where legally possible by mere enclosure rather than by planting, and that the whole area that it is legally possible at any time to enclose should be enclosed

(9) The Forestry Commissioners are the best agency at present available for the control and management of the New Forest on behalf of the public.

The Resolution was proposed by Mr. W. Parkinson Curtis, F.E.S., of Bournemouth, seconded by Mr. Alan Druitt, F.E.S., Christchurch, and was carried unanimously at a fully attended meeting.—E. RIVINHALL GOFFE, Hon. Sec., 162 High Street, Southampton: *October*, 1929.

Second Note on Brachypterolus pulicarius damaging Linaria.—In my note on this matter in the July number (*antea*, p. 159) I described the form of damage to the South European *Linaria purpurea*, cultivated in English gardens, resulting from the attacks of *Brachypterolus pulicarius*, but added that I had never remarked similar damage to our native common yellow toadflax, *Linaria vulgaris*. Had I waited a little longer I should not have made the latter statement, for on July 7th I found, on a waste piece of ground a few yards from where I was staying near Charlbury, a patch of *Linaria vulgaris* in which many plants were much damaged, the terminal racemes being eaten right away, while there was a great development of the lateral racemes, resulting in pronounced 'bushy top.' Moreover, some of the plants were less than six inches high, though this

may have been partly due to the dry weather. None of the plants, either damaged or undamaged, were then in flower. Their tops were full of little black weevils, *Gymnetron antirrhini* Payk., and only a few *Brachypterolus pulicarius* were present, not more than about one to a plant, and in some cases none. The question was thus raised, whether the damage in this instance was due to the Nitidulids or to the weevils. *Gymnetron antirrhini* is known to live in its early stages in the seed-capsules of *Linaria*, and on August 5th I found two blackish weevil-pupae, doubtless of that species, in a nearly ripe capsule of the *Linaria vulgaris* at the same place. But I am inclined to think that the 'bushy top' in *Linaria vulgaris* is mainly due to the *Brachypterolus*, as in the case of *Linaria purpurea*. On July 29th the yellow toadflax at the particular spot under discussion was just coming into flower, and I then watched one of two *Brachypterolus*, found in a leading raceme, in the act of eating into the side of an unopened flower-bud. I saw through a lens that it had eaten a small part of the calyx and through the corolla, and was gnawing down into the ovaries, but leaving the stamens and anthers. On subsequent examination the beetle proved to be a male.

I may add that on July 23rd I saw some plants of *Linaria purpurea* in a garden at Leighton Buzzard, Bedfordshire, very stunted and markedly 'bushy-topped,' as though the *Brachypterolus* had been attacking them earlier in the season, though none of the beetles could be found on the above-mentioned date in July.—Hugh Scott, Charlbury, Oxon: *October 7th,* 1929.

Hydrochus nitidicollis Muls. etc. on Dartmoor.—This rare species was first discovered in Britain in 1906, in the river Meavy, Yelverton, Devon (Col. British Islands, Vol. VI, p. 34). Since then it has turned up in other localities in the same county; but not much seems to be known as to the exact nature of its habitat. On September 6th this year I took three specimens in the Haytor district of Dartmoor, at an elevation of about 1,300 feet. This is, I believe, a higher altitude than any at which it has yet been taken in the county. Professor F. Balfour-Browne kindly identified the three specimens as *Hydrochus nitidicollis* Muls. I revisited the locality with him on September 13th, when we found the species fairly commonly, in company with a few examples of *H. angustatus* Germ. The spot where I found the former on my first visit to the locality—a large open pool—yielded many more specimens, and it is tempting to assume that the conditions were ideal for this species. Three different types of habitat were worked for *H. nitidicollis*, viz.: (1) tufts of *Juncus* at the edge of the deeper waters of the pool; (2) in the gravel and moss where the water deepened very gradually from its shallow edges; and (3) amongst the floating reed-detritus and overhanging grass, etc., at the deeper margins of the pool. All three types of habitat produced the species, but the second (working amongst the gravel and moss in fairly shallow water) was by far the most productive. This method of collecting also produced (on September 6th) two specimens of *Paracymus nigroaeneus* F., already recorded from the South Devon area.

We then shifted our activities to the brook which flows over the north-eastern extremity of the pool. Here one would naturally have expected the *H. nitidicollis* to occur, but no specimens were found there at all, though both of us worked for it. Such other species as *Deronectes latus* St., *Hydroporus septentrionalis* Gyll., *Hydraena gracilis* Germ. and *Eubrychius velatus* Beck. occurred.

The pool above, through which there must be some slight flow of water—shown by the presence of such species as *Deronectes 12-pustulatus* F. and

Hydroporus rivalis Gyll. and sundry Parnidae—seemed to be the only suitable habitat for *H. nitidicollis*, though it occurred at different spots along the north edge of the pool. The hydrogen-ion concentration of the water was found to be approximately neutral. The *Hydrochi* were extremely sluggish, and, though the day was very hot and sunny, they would easily have been overlooked by anyone not expecting to find them. The emergence of the last *Parnus* from the spread-out gleanings of the net, provided a useful signal warning us that the *Hydrochi* would soon appear.—E. J. PEARCE, 18 Milton Road, Swindon, Wilts: *September 24th*, 1929.

Bembidion redtenbacheri Dan. recorded from Carlisle.—In the current number of the 'Koleopterologische Rundschau' (Vol. 15, p. 31), in his paper entitled 'Zoogeographische Ueberaschungen in der Carabiden-gruppe Bembidiini,' Prof. Netolitzky records two specimens of *Bembidion redtenbacheri* from Carlisle. The following is a translation of his note: 'In my collection there are two examples from Carlisle proving the existence of *B. redtenbacheri* also in the North of England.' This record is of great interest as this species has hitherto only been known as British from Dr. Joy's examples captured in the Sheffield district.—B. S. WILLIAMS, 15 Kingcroft Road, Harpenden: *October 2nd*, 1929.

Obrium cantharinum L. in Devon.—In the summer of last year I noticed the females of the small bee *Osmia leucomelana* K. entering holes in dry decayed roots and stems of bushes which had been broken off level with the soil, and were more or less hidden beneath this, at the sides of a lane near Bovey Tracey. The wood was probably birch or oak, and entirely dry and decayed. Later I casually dug out a few short pieces on the chance of breeding Aculeates of some sort in the following year. During the winter and spring of this year much dust was thrown out from the wood, but it was not enclosed until midsummer, so that any insects that might have emerged up to that date would have been free to escape. Subsequently a single red Longicorn emerged, and, this being quite unknown to me by sight, I forwarded a brief description and sketch to Mr. T. H. Edmonds of Totnes, who has informed me that it is, no doubt, *Obrium cantharinum* L., and a rare species, formerly bred in numbers from Aspen by the late Dr. Power. I may add that no species of *Populus* grows in the immediate neighbourhood of the spot whence I obtained this wood.—R. C. L. PERKINS, Newton Abbot: *October 21st*, 1929.

Danaida (Anosia) plexippus L. in the Isle of Wight.—'A RARE BUTTERFLY.—I had the great good fortune on October 12th of seeing a very fine specimen of the rare and handsome Monarch or Milkweed butterfly (*Anosia plexippus*) feeding on a clump of Michaelmas daisies in my garden. I observed it at close range for many minutes as it flew leisurely from clump to clump of the daisies, until unfortunately something disturbed it and it then flew straight up to a great height and away northward out of sight. We spent the rest of the day hunting for it in the neighbourhood without result. I believe only thirty specimens have been recorded in England in the last fifty years. How they reach these shores seems to be unknown. This one was absolutely perfect, the black down and white spots on its body intact, and the beautiful wings without a flaw. It looked as if only just emerged from its chrysalis. Is it possible that the latter may have been brought by a ship in, say, a cargo of bananas to Southampton and the butterfly was therefore born in this country?—MRS. REGINALD PRENDERGAST, Windcliffe, Niton-Undercliff, Isle of Wight.'

(The above extract from the *Times* of October 16th will be read with interest by Lepidopterists, as very few examples of *D. plexippus* have been observed in recent years in our Islands. In the volume of this Magazine for 1914 (Vol. L, pp. 232-6) I have discussed at some length the probable 'means of dispersal' of the butterfly throughout its now vastly extended range. As is suggested by the writer of the note, the chance of the delicate pupa, snugly ensconced in the recesses of a bunch of bananas, accomplishing without accident the comparatively brief voyage from the Canary Islands, or even from the West Indies, and producing the imago after arrival on our shores, is not to be overlooked, though it is, in my own opinion at least, decidedly remote.—J.J.W.

Colias croceus and C. hyale in Hants. in 1929.—A single specimen, a male, of the former species was seen flying in a street at Eastleigh on July 19th. This is the only specimen I have seen this year, and it is, therefore, the more interesting to be able to record the capture of two *C. hyale* on August 16th, at Bitterne, a suburb of Southampton.—Fredk. J. Killington, 22 Litchfield Road, Bitterne Park, Southampton : *September 24th,* 1928.

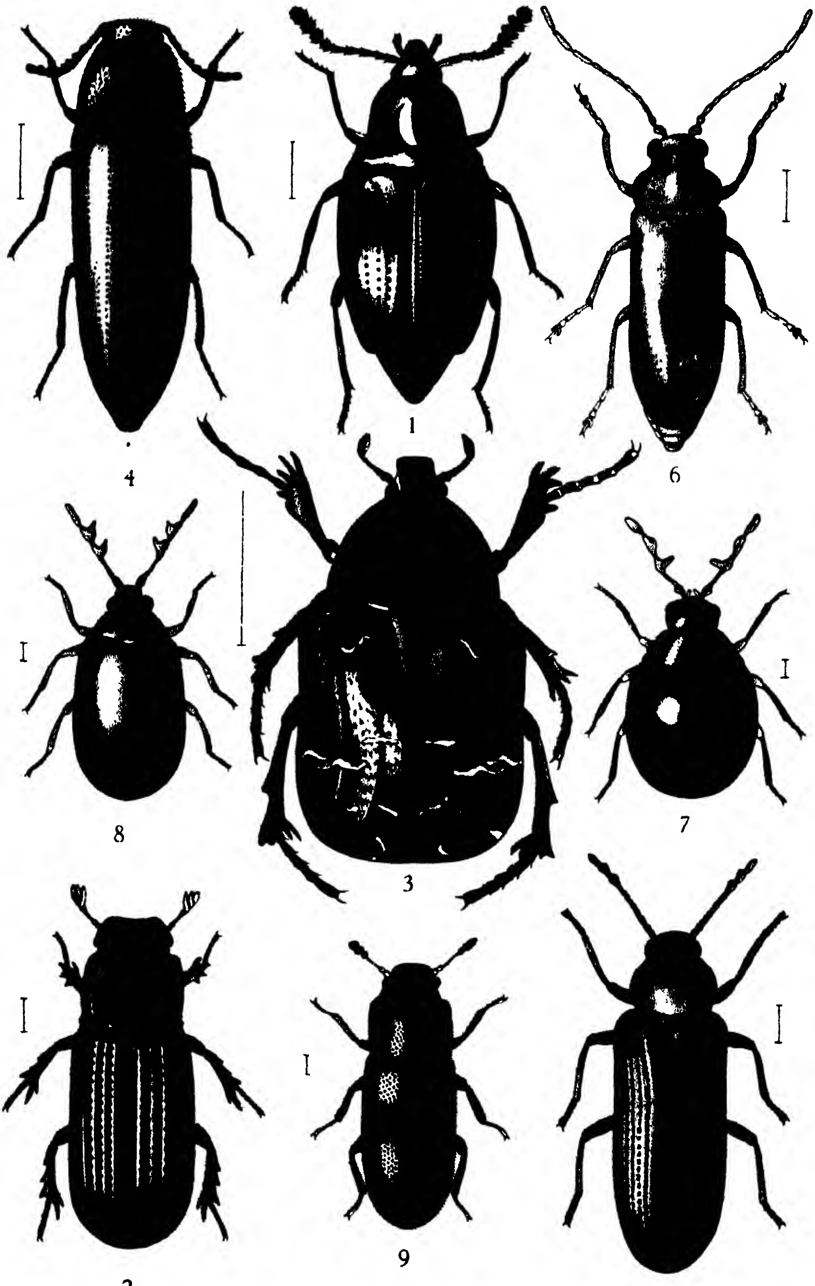
Leionotus tomentosus Thoms. in Dorset.—This Odynerid wasp owes its place on the British list to a few specimens in the Walcott Collection incorporated in the general collection of the Cambridge Museum (*vide* Dr. R. C. L. Perkins' note in E.M.M., 1900, Vol. xxxvi, p. 172). These specimens are dated between 1839 and 1841, and, though inadequately labelled, there appears every reason to believe that they were taken in the Bristol district in company with *Ancistocerus pictus* Curt., a locally common species to which *L. tomentosus* bears a very close general resemblance and with which Walcott's were mixed up.

Since its addition to the British list, there have apparently been no further records of this species. I am, however, now able to record its occurrence on Portland (Dorset) from a ♂ captured on the 26th of June this year. This was one of only three specimens of *Odynerus* taken from a situation (Church Hope Cove) where on that day *Odynerus* occurred in some numbers. In spite of the fact that *A. pictus* Curt. and *A. parietum* are common here (the former especially so in this and neighbouring parts of Portland), I have little doubt that *L. tomentosus* was occurring freely. Unfortunately I did not have a chance of returning to verify this. (I should add that I have since been informed by Dr. Perkins of the capture of a ♀ near Sidmouth this year, which no doubt is recorded elsewhere.)

Dr. Perkins points out that there is every indication that Walcott's *L. tomentosus* were taken at the same time as *A. pictus*. In this fresh locality *A. pictus* is particularly common. It is therefore interesting to note similarity of habitat coinciding with similar superficial appearance (relating mainly to form, sculpture, and distribution of colour) and it suggests that there may be more than coincidence in the resemblance of the two species.—G. M. Spooner, The Brown House, Weymouth : *October,* 1929.

Late bees in Devon.—On October 17th, just outside the town of Newton Abbot, I picked a very fresh ♂ of *Halictus xanthopus* K. from a tansy flower and a freshly-emerged ♂ of *Andrena rosae* Panz. of the most highly-coloured (red) form from a stray flower of *Rubus* on a bush, which was covered with ripe fruit.

The *Andrena rosae,* owing to the fact that I had no fitting receptacle, unfortunately escaped, but I believe it was an abnormally emerged specimen of



B. Hopkins del.

P. J. Mulder & Son., Leiden, lith.

COLEOPTERA NEW TO THE BRITISH LIST 1913-1929.

the spring brood (*eximia* Sm.). I had seen the summer brood, or true *rosae*, at a considerable elevation above sea level, and already very much worn six weeks before the above-mentioned date.

On the Continent I believe it is known that the ♂ of *Halictus xanthopus* sometimes does not emerge until the spring, and in the abnormally cold and wet season of 1888 the males of a big colony under observation were only beginning to appear about the 9th of October, but in a summer of prolonged warmth and bright sunshine like the present so late an occurrence of the species, when the *Bombi* in the locality had already gone into hibernation, is surprising.—R. C. L. PERKINS: *October 21st*, 1929.

Hylaeus gibbus S. Saund. in Sussex.—In Volume lxiii, p. 67, of this Magazine, I had the pleasure of recording the capture of a female of this rare bee by Mr. J. R. le B. Tomlin at Rye; I have recently received from him an example of the male sex, which was swept by him in the first week of this month. The locality was a timber-yard on the bank of the river Tillingham, a tributary of the Rother, and as Mr. Tomlin was paying special attention to the thistle *Carduus arvensis* at the time, it is probable that the bee was on the flowers of that plant.—H. M. HALLETT, 64 Westbourne Road, Penarth: *September 30th*, 1929.

Xiphydria camelus L. in Glamorgan.—In his 'Help Notes' (Ent. Mo. Mag., Vol. xl, p. 33, 1904) the Rev. F. D. Morice describes this rare sawfly as being a northern insect and attached to *Alnus*; it is therefore of interest to find it occurring in this county. On August 4th last I found the recently dead alder branches along the banks of the little river Kenfig near Porthcawl closely riddled with the burrows of this species, and eventually succeeded in obtaining four males. Dr. R. C. L. Perkins has confirmed the identification, and tells me that he has taken it on the river Bovey about six miles above Newton Abbot, so that its distribution is more extended than was indicated by Mr. Morice.—H. M. HALLETT: *September 30th*, 1929.

The swarming of Oscinis (Oscinella) pallipes n. sp. at Khartum.—With reference to the interesting note by Mr. H. G. Kearns on the swarming of *Chloropisca circumdata* Meig. which appeared in a previous number of this Magazine (*antea*, pp. 205 and 206), I would call attention to a similar swarming and nuisance caused by *Oscinis* (*Oscinella*) *pallipes* n. sp., as recorded by Mr. R. Cottam of the Wellcome Tropical Research Laboratories, Khartum, in the 'Lancashire and Cheshire Naturalist' for December—January, 1923, pp. 101—104, Plate III, containing three figures. The fly was identified by Dr. C. G. Lamb.—J. E. M. MELLOR, Ministry of Agriculture, Giza, Egypt: *September 17th*, 1929.

Obituary.

The Rev. Charles Francis Thornewill, M.A., passed away peacefully on October 2nd at his residence in Oxford, after a brief illness, at the great age of 89 years. He was educated at Repton School and Corpus Christi College, Oxford, where he graduated in 1863 with a good degree in Natural Science. Taking Holy Orders in the following year, in 1870 he was appointed to the living of Burton-on-Trent, which he retained until 1892; for two years he was

Vicar of Bakewell, Derbyshire, and from 1894 until 1910, when he retired from active clerical life, he was Vicar of Calverhall, Shropshire. The remainder of his days were passed tranquilly in the congenial surroundings of Oxford.

He appears to have turned his attention to our science at an early age, and at Burton-on-Trent he was an active member of the circle of prominent Entomologists resident in that town during the seventies and eighties of the last century, which then included such well-known names as Dr. P. B. Mason, the Rev. W. W. Fowler, Dr. W. Garneys, Edwin Brown, J. T. Harris and others. For many years he was one of the best-known and most successful Lepidopterists in the Midland Counties, and his interest in his favourite Order of insects remained unabated to the end of his long life. The writer of this notice has a pleasant recollection of an excursion to Tubney, Berks, eight years ago, in pursuit of *Polygonia c-album*, by a trio of entomologists, of whom Mr. Thornwill was the senior member, and whose united ages amounted to no fewer than 225 years!

Many field-notes of considerable interest from his pen have appeared in past years in the pages of the Entomological magazines, our own included; and from 1889 to 1895 he was a Fellow of the Entomological Society of London. His fine collection of Macro-Lepidoptera was disposed of a few years before his decease.

One of the kindest-hearted and most genial of men, Mr. Thornewill assuredly will be greatly missed by his numerous friends in Oxford and elsewhere. He was twice married, and to his widow, as well as to his family by his first wife, we tender our sincere sympathy in their bereavement.—J.J.W.

Society.

ENTOMOLOGICAL SOCIETY OF LONDON: *Wednesday, October 2nd*, 1929.—Dr. K. Jordan, President, in the Chair.

In opening the meeting, the President expressed the regret of the Council that the Society was not yet able to meet in its new Meeting Room, and explained the circumstances that had rendered this impossible.

W. E. Hamlin, 12 Wimbledon Hill Road, S.W.19, was elected a Fellow of the Society.

Mr. H. Donisthorpe exhibited and made remarks upon new and rare beetles taken by him in Windsor Forest. Professor E. B. Poulton, F.R.S., communicated the following notes from various correspondents:—(1) A female *Danaida chrysippus* L., taken in coitu with a dead male, by Capt. K. J. Hayward. (2) The Pentatomid bug, *Troilus* (*Podisus*) *luridus* F., persistently devouring a Noctuid larva, after falling into the beating tray. (3) The orderly methods of the ant *Megaponera foetens* F. in its attacks on Termites. (4) The nesting together of Birds, Wasps and Ants, by Dr. J. G. Myers. (5) Experiments with insect-food on the African lemur *Perodicticus potto*, Lesson, by Capt C. R. S. Pitman.

The following papers were read:—(1) 'Butterfly Migration in British Guiana,' II, by Mr. L. D. Cleare, Jun. (2) 'On an apparently new sense organ in Lepidoptera,' by Dr. H. Eltringham. (3) 'The Geometridae of the St. George Expedition,' by Mr. L. D. Prout. (4) 'A Contribution to the Ethology of the Meliponinae,' by Dr. G. Salt. (5) 'Descriptions of new African Rhopalocera,' by Professor Poulton and others.—S. A. NEAVE, *Hon. Sec.*

THE ATTRACTIVE FORCE IN ASSEMBLING INSECTS.

BY F. R. ELLISTON WRIGHT, M.B., F.E.S.

Most observers have failed to recognise that there are *two* entirely different forces involved in the guidance and attraction of males in 'assembling.' Attraction in the near or immediate neighbourhood of the female operates almost certainly through a sense of smell; while attraction from a distance, probably the more important, is almost as certainly due to some sense other than that of smell.

A male in the immediate neighbourhood may crawl aimlessly over an empty pupa-shell or empty box which has held a female. This is attraction of the first order, the same as that which guides a male to the female after he has arrived from a distance—he flies straight from a distance to some position near the female, then dodges about and finds her by the sense of smell.

But attraction from a distance, the characteristic feature in 'assembling,' only functions when the female is 'calling' (continuous rapid fine vibratory movements of wings with extrusion and extension of terminal parts of abdomen), and ceases at once when the female stops 'calling.' To demonstrate this satisfactorily it is better to take a day-flying species and one that 'assembles' readily; observation is often difficult by night. The following is a typical instance from my note-book, written a few years ago without any idea of publication :

'Female *Lasiocampa quercus*; emerged July 13th; placed in white gauze cage in greenhouse, with door open.

July 14th. Dull and windy; no males came (*L. quercus* only "calls" in sunshine).

July 15th, 16th and 17th. Still dull; no males came.

July 18th. Bright sun; three males came.

July 19th. Unable to observe.

July 20th. A fine day; about 20 males came during period of observation (about two hours).

July 21st. Still fine; 24 males arrived; female began laying unfertile eggs.

July 22nd and 23rd. Six males came on each day during observation.

July 24th. Unable to observe.

July 25th. Female died.

I could only watch in the afternoon. The males all came during

sunshine, when the female was "calling." No males came when the female was not calling.'

I have often 'assembled' on a bare, high hill where males could be seen coming from a considerable distance. They may come from any direction—quite often in the same direction as the wind. They fly more or less in a straight line until near the spot where the female is, and then zig-zag about until they find her. I think it very likely they come from a distance of a mile or more; they certainly are not guided by smell, and the attraction ceases as soon as the female stops 'calling.' I have often 'assembled' with night-flyers—for instance, *Stauropus fagi*—and have noticed that when a male came the female was 'calling.'

I witnessed last May the pairing of *Saturnia carpini* in the wild state. I watched the newly-emerged female until she 'called' at about 3 p.m. (summer time), and saw a male come from the south-eastward; a moderate breeze was blowing from about the west, and the sun was shining. They paired almost at once, such delay as there was being due to awkwardly placed vegetation. I have noticed that the first male to come is accepted, and a male in any condition is accepted. I have rubbed nearly all the scales off the wings of a male, keeping others of the same sex away, and the battered relic was accepted as soon as he was allowed access to the female.

Fabre was left undecided and mystified by the results of his experiments, and other observers have drawn wrong conclusions simply because they did not realise the difference in the forces acting in attraction from a distance and attraction near at hand. In Prof. Poulton's very interesting notes on the prevention of in-breeding in species with gregarious larvae (Proc. Ent. Soc., April, 1928) his remarks regarding ♀ *S. carpini* not attracting when wrapped up in brown paper are understandable, as of course this sun-loving insect would not 'call' while so wrapped up. Attraction from a distance, and Prof. Poulton's 'preliminary flight' of the males, are probably more closely connected than might at first be supposed. It would be interesting to take freshly-emerged (marked) males to a suitable distance from a female and observe whether at sufficient distance they would not fly to her and pair with her.

Braunton, N. Devon.
October 20th, 1929.

ATHETA PROCERA Kr., AN ADDITION TO THE BRITISH STAPHYLINIDAE.

BY B. S. WILLIAMS.

In the European Catalogue of Heyden, Reitter & Weise (1906) *Atheta procera* Kr. and *A. subglabra* Shp. are considered synonymous and placed in the s.g. *Philhygra* M. & R. This was repeated in the Exchange List of British Coleoptera of Newbery & Sharp (1915). In the Palaearctic Catalogue of Winkler (now in the course of publication) *A. procera* and *A. subglabra* are accorded specific rank and are to be found in the s.g. *Philhygra.*

Turning from the Catalogues to the text-books, we find Ganglbauer (Kafer Mitteleuropa II) has appreciated the differences between Kraatz's *procera* and Sharp's *subglabra,* widely separating them by placing *procera* in s.g. *Dimetrota* M. & R. (p. 165) and *subglabra* in s.g. *Philhygra* (p. 199). Reitter (Fauna Germ., Kaf. II) assigns *procera* Kr. (=*subglabra* Shp.) to the s.g. *Hygroecia* Rey (6. 58), and later on (p. 69) repeats the species—without the synonym—in the s.g. *Dimetrota*! Canon Fowler (Col. Brit. Isles, II, p. 87), when dealing with *subglabra,* makes no mention of *procera,* and places Sharp's species between *monticola* Th. and *nigella* Er. From his introductory remarks to Group 7 (l.c. p. 84) it is evident that Fowler was not very certain about the position *subglabra* should occupy, as he says '*H. subglabra* bears a somewhat close resemblance to *H. palustris,* near which perhaps it might be more correctly placed.' Dr. Cameron, in his Synoptic Table of the British species of *Aleuonota, Atheta* and *Sipalia* (Trans. Ent. Soc. Lond., 1913, p. 301), says of *A. subglabra,* 'According to Fauvel, ♂ with 8th dorsal plate finely crenulate at posterior border.' This goes to shew that Fauvel either did not know *subglabra* or confused the two species, as the ♂ of *procera* has the plate broadly truncate, the truncated edge being very finely crenulate, the apical edge of the corresponding plate in *subglabra* being slightly rounded with no trace of crenulations.

From these uncertainties and complications it is apparent that the two species have constituted a knotty problem to systematists. I imagine this is principally due to Kraatz's species being confused with Sharp's, but even when both were given specific rank the difficulty of satisfactorily placing *procera* remained. This may be due to the shape of the abdomen. Ganglbauer considered it pointed, as witness his inclusion of this species in s.g. *Dimetrota*; other authors have considered it parallel-sided and placed it in s.g. *Philhygra.* My own view, after much thought, is that *procera* should follow *subglabra* in the s.g. *Philhygra.*

I was fortunate enough to take a ♂ example of *A. procera* when on a collecting holiday with my friend, Mr. P. Harwood, at Aviemore in August last, and have pleasure in adding it to the list of British *Athetae*. The specimen occurred in carrion. My best thanks are due to Col. Deville for his kindness in examining the specimen and checking the determination.

A. procera resembles *subglabra*: my only example is a slightly larger insect, with longer antennae. The head is plainly shagreened and furnished with remotely spaced asperities. In *subglabra* the head is not or only very obsoletely shagreened, and the asperities are smaller and more closely spaced. *A. procera* has the thorax wider and more closely and coarsely sculptured; the elytra are more ample, somewhat depressed and finely alutaceous owing to the minute and close puncturation; there is no suggestion of asperities. *A. subglabra* has the elytra less ample, more convex, and when examined under a high-power (stereoscopic) lens it is seen the sculpture is decidedly asperate, consisting of minute granules. The ♂ characters of the two species are very different. *A. procera* has the head flattened*; in *subglabra* it is convex. The secondary sexual differences of the 6th free tergite have been given above. The aedeagus of *procera* is fully one and a half times the length of that of *subglabra*, with a differently shaped median lobe.

15 Kingcroft Road, Harpenden.
November 13th, 1929.

RE-OCCURRENCE OF *CRYPTOCEPHALUS DECEMMACULATUS* L. IN STAFFORDSHIRE.

BY C. E. STOTT, F.E.S.

Since the days when *Crytocephalus decemmaculatus* was taken by Dr. Sharp, E. C. Rye, and R. Hislop on dwarf sallow at Camachgouran, Loch Rannoch (E.M.M., Vol. II, p. 52), and by Messrs. Harris and Garneys on birch at Chartley Moss in Staffordshire (E.M.M., Vol. III, p. 67), during the years 1864-5, and subsequently by Messrs. J. Kidson Taylor and J. Ray Hardy on dwarf sallow in the Burnt Woods, Staffs., in 1870 (E.M.M., Vol. VII, p. 80), this very rare species appears to have been entirely lost sight of as a British species, and I believe has not been taken by any of the present generation of Coleopterists in this country.

Circumstances required me to come and live in this county, and for the last two years many fruitless journeys have been made to

* I have never seen a female and am unable to give any particulars as to the shape of the head in that sex. The flattening of the head in the male of *procera* may be sexual, as there are many species of *Atheta* in which the head of the male is flattened or excavated.

Chartley Moss in the hope of proving that the insect still existed in that locality : and in consequence of repeated failures, together with the experiences of collectors in Scotland in modern days, I had almost come to the conclusion that it was yet another case of a species being lost to the British List.

This year, my friend Mr. Philip Harwood stayed with me a few days, and I took him over to the Moss, which is strictly preserved and difficult of access; we went to the place where I thought it might occur, and after going over the ground very carefully, we were at last successful in finding this pretty little beetle on birch in very limited numbers, and not far from the spot where I believed it to have been originally taken.

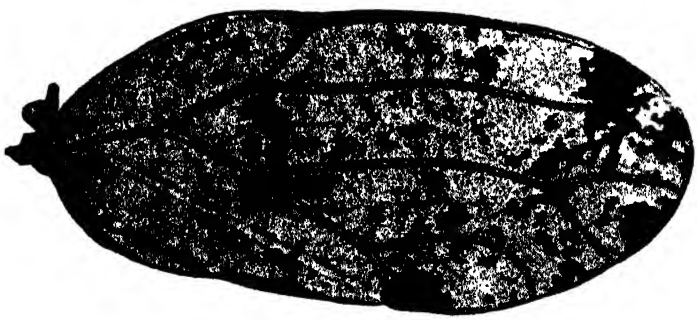
It must always be a great pleasure to recover an insect so long given up for lost, and a matter for congratulation that we still retain one of our rarest *Cryptocephali* to the British fauna : and, because of its elusive nature and environment, *C. decemmaculatus* will I think always remain a scarce species.

I ought to add that the var. *bothnicus* L. also occurred, in smaller numbers than the type-form.

Armitage, near Stafford.
November 8th, 1929.

DESCRIPTION OF AN APPARENTLY NEW BRITISH PSYLLID (HOMOPTERA).

BY F. LAING, M.A., B.SC.



Aphalara bagnalli, sp. n., Tegmen.

Aphalara bagnalli sp. n.

♂, ♀. Head, antennal segments 1, 2, 9, 10, the thoracic segments, the femora, the distal tarsal segment, six dorsal bars, four spots on the lateral area and six ventral bars, of the abdomen, and the genitalia, blackish-brown; an-

tennal segments 3 to 8, the tibia and the proximal tarsal segment of each pair of legs, very pale yellow; mesonotum with two median, a submedian and a lateral longitudinal reddish-brown streak, the submedian scarcely reaching the anterior border; the submedian posterior angles of the dorsulum and the anterior outer angles of the mesoscutellum, very pale, almost whitish; metascutellum pale; the tegmen spotted as shown in the figure, veins yellowish; the wing with a brownish streak on the basal vein and faintly tinted on the anal area; the abdominal areas between the dark brown banding probably green in life.

Head, including eyes, approximately twice as broad as long, each half of vertex subrectangular, with the anterior margin gently convex, with a very shallow crater-like depression occupying most of the area, leaving only a narrow raised rim; antennae subequal to width of head (including eyes); pronotum well marked, the front and hind margins subparallel; dorsulum and mesonotum scarcely arched, both presenting a distinctly cellular appearance; tegmen a little more than twice as long as broad, the nervures slightly raised above the membrane, the latter cellular in nature, the black pigment, forming the dark areas, being deposited in the cells; wing transparent, the cellular appearance being visible along the anal angle; hind tibia with an apical ring of eight stout black spines. Length, 2.8 mm.; length of tegmen, 2 mm.

On juniper growing on the Downs near Salisbury, July 1929 (*R. S. Bagnall*).

Most closely related to, and may be confused in collections with, *A. exilis* Web.-Mohr, but it may be readily distinguished from that species by the much darker coloration of the head, thorax and genitalia, particularly so in the case of the female, the maculation of the tegmen, and in the shape of the vertex.

British Museum (Natural History).
November 22nd, 1929.

THE OVIPOSITION OF *PONTANIA GALLICOLA* STEPH. (THE BEAN GALL OF WILLOWS).

BY ISABEL M. MURPHY.

The sawfly *Pontania gallicola* Steph., which is responsible for the 'Bean Gall' of the leaves of certain willows, *Salix fragilis* and varieties of *Salix triandra*, produces two broods in a year. The spring brood emerges in late April and the summer brood in July. The eggs are laid very soon after emergence, and the procedure of the oviposition is similar in both broods. A description is given of that of the summer brood.

The fly emerges in numbers in mid-July. At this period the willow shoots are growing rapidly and the terminal buds unfolding their leaves quickly. From observations carried out from mid-July to mid-August, on a badly attacked tree of *S. fragilis*, it is found that numerous sawflies visit the tree on still, sunny afternoons. Few sawflies are on the wing early in the morning, but

towards mid-day they become abundant. The majority of them occur in the third week of July, but the insects become scarce towards the end of the month.

On a sunny but windy day many sawflies will visit the tree, but the wind shakes the tips of the twigs so that the insect cannot remain long enough on the bud for oviposition.

The female sawfly flies above a branch and finally settles on a twig, often on the unfolded terminal bud, but sometimes lower down the stem, from which position it eventually crawls up to the bud. The leaves chosen for oviposition are usually at about the same stage of development; the outermost leaf of the terminal bud has separated a little, at the bottom and around the edges, from those immediately underneath it.

The sawfly crawls to the tip of the outermost leaf, and after waiting a short time in this position, moves a little way down the leaf and remains there, the abdomen working up and down, for five to ten minutes. The insect then takes up a position about a quarter way down the leaf, near the mid-rib, and finally pierces the leaf; maintaining this position, it moves down the leaf a little way, thus making a short slit, through which the egg is deposited inside the leaf.

The sawfly may crawl away after making one such slit, but more usually it walks down the leaf, keeping a course parallel with the mid-rib, and repeatedly pushes down the ovipositor and deposits an egg in each slit. After walking down one side of the leaf, the fly walks up the other, still laying eggs at intervals. It then flies away.

The leaf, when examined immediately, shows a series of small blisters, with a puncture on the outer (later the lower) surface. The leaf shows no puncture on the inner surface.

The leaf, at this period, is of a light yellowish green colour and very tender. The blister-like gall has none of the solidity that it acquires later, but is like a small cushion of air, about 1/16th of an inch in diameter. If the leaf be held up to the light, a minute egg can be seen through the tissues.

The egg, when examined microscopically, is oval and opaque and of slightly bluish-white colour. It is 0.5 mm. long and 0.18 mm. in diameter.

The day following oviposition the leaf has usually unfolded from the bud, and a sawfly oviposits in the next oldest leaf, now on the outside of the bud; thus as the leaves unfold they become galled.

If a leaf has been slightly galled already, whilst it is still folded round the bud, another sawfly may further gall it; but should it have been previously badly galled, a sawfly may examine but not attack it, flying away and attacking another bud.

The day following oviposition the gall is of a slightly larger size, and has turned red round the edges. Its subsequent development consists of the reddening of the whole surface, and the multiplication of the chlorenchyma under the hardening epidermis. The green tissue, which is evident in the inside of the galls, grows from the surface inwards, and sometimes a great development may take place before the egg hatches. If the egg is late in hatching, as it may be when the weather is cool, or the host-plant in an exposed position, the gall may be a solid oval structure, one-third of an inch long and one-quarter inch diameter. The thickness from the upper to the lower surface may be as much as the length. The size of the gall depends on the species of willow.

In the case of the tree of *Salix fragilis* under observation, it was in a very sheltered position, and the weather very warm. In several cases the egg took six days to hatch, and the gall had not altered greatly in size before the larva emerged, although a mass of green tissue had been produced. The gall underwent a great increase in size after the larva had commenced feeding. In the case of 'Black Maul' (*S. triandra*) the gall frequently developed for thre weeks, before the egg hatched, and was by then of nearly full size; after the egg hatched little further increase of the gall took place.

The most rapid development of the gall tissues takes place during the period of rapid leaf growth, but the gall tissues are still capable of further growth after the leaf has reached its full growth.

The University, Bristol.
September, 1929.

ADDITIONS TO THE COLLEMBOLA OF NEW ZEALAND.

BY H. WOMERSLEY, A.L.S., F.E.S.

The species of Collembola so far known from New Zealand number only fifteen, the majority of which were described by Dr. G. H. Carpenter (Mem. & Proc. Manchester Lit. & Phil. Soc., Vol. 69, 1925). Of these, four are widely distributed in the Palaearctic Region and are probably introductions to New Zealand.

For the additions which I am able to make here to the previously known forms I am indebted to Dr. J. W. Campbell, New Brighton, South Island, who collected them, and to Mr. J. V. Pear-

man, to whom they were sent and who kindly passed them on to me for study.

Sub-order ARTHROPLEONA C.B.

Family: **Entomobryidae** Töm.

Sub-family: Tomocerinae Schffr.

Tomocerus minor Lubbock.

There were two specimens of this species, but unfortunately both were lacking the third and fourth antennal joints. In all other details, however, they agreed with the European form of this species. This Springtail is a very common species in both the Palaearctic and Nearctic Zones, and its presence in the Southern Hemisphere is probably only to be accounted for by introduction, as in the case of the four species already alluded to.

Locality. Ross, South Island, 10/3/29: Dr. J. W. Campbell.

Sub-family: Entomobryinae Schffr., C.B.

Lepidocyrtoides coeruleus Schött.

The other two specimens were referable to this species described by Schött from Queensland (1917). The genus is indigenous to the Australian Region, from which nine species are known.

Locality. Ross, South Island, 10/3/29: Dr. J. W. Campbell.

Sunny Meads, West Town, Som.
October, 1929.

Coleoptera at Braunton Burrows.—At the end of last April, while spending a few days in the south of Devonshire, I was able to pay a hurried visit to Braunton Burrows, on a fine sunny but windy day. My captures were, however, quite interesting: two *Cardiophorus equiseti* Hbst. were found on one of the sandhills, but nothing else occurred on these barren wastes; on the damp, flat areas lying between two ranges of sandhills I dug out from their burrows *Dyschirius impunctipennis* Daws. and *D. politus* Dej.—they were apparently preying upon *Bledius fuscipes* Rye, which was very abundant in the burrows, and on *B. arenarius* Pk, which was much scarcer; in another area of these damp flats *Aphodius plagiatus* L. occurred in profusion in the black form, but for the first time in my collecting experience I found two specimens of the type form, with the bright red splash on the elytra; *Bembidium pallidipenne* Ill. was not uncommon in the same spots.—T. HUDSON BEARE, 10 Regent Terrace, Edinburgh: *November 8th*, 1929.

Staphylinus fulvipes Scop. in Wyre Forest.—While collecting in Wyre Forest with my friends, Mr. G. H. Ashe and Mr. Bowhill, on June 2nd last, I was fortunate enough to 'spot' a specimen of the above species running across a sandy path on a steep bank. Though we diligently searched all round the lucky spot, we were not fortunate enough to find another specimen. I believe this is the first time this rare species has been found in that area. My only other capture of the species was in the Black Wood, Rannoch, many years ago, under almost exactly similar conditions, *viz.* that the insect was running across a sandy path.—T. HUDSON BEARE: *November 8th*, 1929.

Bryocharis (Megacronus) analis Payk. var. merdaria Gyll. in Wales: A correction.—The late Mr. E. A. Newbury introduced this beetle as an addition to our British fauna (Ent. Mo. Mag., 1919, p. 32) on the strength of a specimen I took at Llandrindod Wells in 1918. I have always been dubious about this specimen, and recently asked my friend Mr. J. H. Keys for his opinion: he has now returned it as *Mycetoporus punctus* Gyll. I think it therefore desirable to now withdraw the record.—C. E. STOTT, Armitage, near Stafford: *November 1st, 1929.*

Notes on Oxford butterflies etc. in 1929.—The brilliant but exceptionally droughty summer recently ended has been by no means generally productive in insects in this district, and butterflies in particular, with a few exceptions, have been notably less abundant than in more normal seasons. Thus the Lycaenids, with the exception of *Cyaniris argiolus,* have been decidedly scarce, and not a single example of any of the 'Hairstreaks' has come under my notice in any stage. The common Satyridae were also much less plentiful than usual, except *Melanargia galatea*; a strong brood of this species was on the wing at Tubney as early as June 29th, *Argynnis adippe,* in fine condition, being plentiful at privet-blossom on the same day. *Melitaea aurinia*, which here varies greatly in abundance from year to year, duly put in an appearance at Cothill, but it could not be called plentiful.

Neither *Colias croceus* (*edusa*) nor *Pyrameis cardui* were seen here by me or otherwise reported during the entire season, and the early summer emergence of *Aglais urticae* was by no means a large one. However, in September this butterfly, which in certain bygone summers has been almost a rarity at Oxford (cf. Ent. Mo. Mag., Vol. LIV, pp. 247-8) appeared quite suddenly in such profusion as to attract general attention for a few days; some thirty or forty fresh specimens being seen at once on a small bush of *Buddleia variabilis* in the Museum grounds, and the Michaelmas daisies attracting the butterfly in equal numbers. The fine warm weather prevailing at the time seemed to have the effect of sending them promptly into their winter quarters, as they were nearly all gone by the end of the month. *Pyrameis atalanta,* though by no means scarce, was not as numerous as is often the case here, while *Vanessa io* was decidedly uncommon, as no larvae and only a very few specimens of the perfect insect came under my notice. Nor did I see anything of the early summer brood of *Polygonia c-album;* but the first fresh autumnal specimens of this interesting butterfly was observed at Wytham Park on September 13th, and on the following day it was quite plentiful in some damp fields adjoining Tubney Wood, which were then full of *Scabiosa Succisa* in bloom. On this occasion *P. c-album* outnumbered even *A. urticae,* and it would now appear to have established a firm footing in the Oxford district. The wild hop, *Humulus Lupulus*, is abundant in the hedges and thickets, and with the common nettle furnishes a plentiful food-supply for the larva of the butterfly, but as far as I am aware it has not as yet been found in any of its earlier stages.

Gonepteryx rhamni was not as common this year as is usually the case, but it lingered on the wing as late as October 16th. On one or two occasions fresh examples of *Sesia stellatarum* were observed feeding at the *Buddleia* blossom, and *Plusia gamma*, though now and then seen in early summer and autumn, has certainly not lived up to its reputation as a 'pest' during the season of 1929.—JAMES J. WALKER, Aorangi, Lonsdale Road, Summertown, Oxford: *November 11th, 1929.*

Pionosomus varius Wolff etc. at Deal.—While staying at Deal during the latter half of September I was agreeably surprised to find Coleoptera and Hemiptera much more plentiful on the sandhills than I had expected, considering the long drought and general poorness of the season, and was glad to meet with many species I had not seen alive since my last visit to the locality eighteen years ago. While searching one afternoon at the roots of the marram grass I found a small Lygaeid bug running over my arm, which proved to be the pretty and extremely local little *Pionosomus varius,* a species I had never met with in my earlier visits. Just previously to finding it I had noticed in another spot several specimens of what I took, unfortunately without examination, to be one of the common species of *Scolopostethus*, which I have now little doubt were the same species.

Pionosomus is represented in the Power Collection of British Hemiptera-Heteroptera at South Kensington only by a very old damaged specimen taken by Mr. A. Piffard at Deal. The late Mr. Butler, in his fine work on the British Hemiptera published in 1923, quoted Mr. Piffard's note of his capture in this Magazine (Vol. I, 2nd series, p. 221 [August, 1890]), and also a later note of Commander Walker's of 1898 recording its reoccurrence there, but does not give any more recent records. In his collection (now in the possession of the British Museum), however, there is a good series of the species labelled as taken by Mr. Bedwell at Deal in September, 1923. Hemipterists will, I think, be interested to know that it still survives in its original British headquarters, notwithstanding its recent discovery by Mr. Duffield at Littlestone.

I may also mention the capture of *Berytus crassipes* H.-S. (1) in moss on the sandhills.

At St. Margaret's Bay I was sorry to find that the habitat of the extremely local weevil, *Hypera tigrina* Boh., had been practically destroyed, the ledge under the cliff where it occurred having been overwhelmed by a fall of the cliff and cleared away with the chalk debris. One hopes, however, that a few may still survive amongst the vegetation high up on the sides of the cliff, where its foodplant, *Daucus Carota* (var. *gummifer* Lamk.) still grows. On the top of the cliff everything was burnt up, and I got nothing but a single damaged specimen of *Licinus depressus* Payk. and a few *Adimonia tanaceti* L. on ground already marked out for building, which is proceeding everywhere.—F. B. JENNINGS, 152 Silver Street, Upper Edmonton, N.18: *November 14th,* 1929.

Idiocerus rutilans Kbm. recorded as British.—Owing to its omission from the index to additional British species in the volume of this Magazine for 1909, Edwards' original record of *Idiocerus rutilans* Kbm. as a British insect was overlooked. It appears, of course, in Vol. XLV, pp. 6-7 (January, 1909). My thanks are due to Mr. F. B. Jennings for drawing attention to this omission.—W. E. CHINA, British Museum (Natural History): *November 8th,* 1929.

The Swarming of the Cabbage Aphis.—The clouds of winged Aphids which appeared in various parts of the country during the hot, dry weather of last September must have attracted the attention of almost everyone. The numbers were so phenomenal that it seems as well that particulars of the time of occurrence of these extraordinary swarms and their relative abundance in different areas should be placed on record. The following observations made in Cambridge are published in the hope that others will send in similar notes from other districts. Prof. F. V. Theobald has kindly identified the species concerned.

The Aphids first became really abundant in the Cambridge streets on Sep-

tember 4th, although great swarms were noticed at Bishop's Stortford on the 2nd. They increased in numbers steadily until the 8th, when they were present in countless millions. The commonest species by far was *Brevicoryne brassicae*, but *Anuraphis padi* and *Capitophorus ribis* were also present. They were so numerous that their dead bodies formed a scum in places an inch or more in thickness on the surface of the water in the Trumpington Street conduit, and here and there the air was so thick with them that they made an appreciable difference to the brightness of the sunlight. The way in which they were restricted to the immediate vicinity of houses and gardens was very striking; in the open country there were none to be seen. On the 9th of September they were less noticeable, and on the 10th much fewer. The numbers remained low for three days, followed by a slight increase which reached its highest point on the 15th. No more were observed after September 16th.—W. F. THORPE, Zoological Laboratory, Cambridge: *November 4th*, 1929.

An Introduced Blattid.—A few weeks ago a boy brought me a fine large exotic cockroach—very much alive—which had arrived in a crate of bananas, the origin of which was not ascertained. Attempts to keep it alive for long failed; it only survived for about ten days. It drank profusely, but refused to eat bananas, apple-slices, bread, or anything else. On its decease I sent it up to Mr. B. P. Uvarov for identification. He very kindly informs me that it is *Blaberus discoidalis* Serv., which occurs in Central America and the West Indies. He also states that W. J. Lucas (British Orthoptera, p. 117) mentions it as having been introduced into this country (under the synonym *Blaberus cubensis* Sauss.), and that the fact of its reoccurrence in Britain ought to be put on record.—E. J. PEARCE, 17 Milton Road, Swindon, Wilts.: *November 22nd*, 1929.

Societies.

ENTOMOLOGICAL CLUB.—A meeting of the Entomological Club was held at Speldhurst Close, Sevenoaks, on September 14th, 1929, Mr. H. Willoughby-Ellis in the Chair.

Members present: Mr. H. Willoughby-Ellis, Mr. Robert Adkin, Mr. Jas. E. Collin, Mr. W. J. Kaye. Visitors present: Capt. E. Bagwell-Purefoy, Mr. E. C. Bedwell, Dr. E. A. Cockayne, Capt. A. F. Hemming, Dr. Karl Jordan, Mr. F. Laing, Mr. G. C. Leman, Mr. Frederick Muir, Mr. W. Rait Smith, Capt. N. D. Riley, Mr. W. H. T. Tams, Mr. B. S. Williams.

The members and visitors arrived at Speldhurst Close at 2.30 p.m. and were received by Mr. and Mrs. Willoughby-Ellis. In beautiful weather, the afternoon was spent in the gardens and woods attached to Speldhurst Close, where tea and light refreshments were provided. The whole of the natural history collections were open for inspection throughout the day. The portion specially arranged for show included the complete series of British Sesiidae and Sphingidae, and many interesting varieties of British butterflies. A collection of Coleoptera showing the distribution of British beetles in the Midland Counties collected by the Chairman within a radius of forty miles from Birmingham, and in addition the completed portions of the collections of Coleoptera he has presented to Harrow School and to the Torquay Natural History Society, were shown.

Supper was served at 7.30 p.m., the guests leaving about 11 o'clock. Those who were able to remain spent the week-end at Speldhurst Close, with a view to making an Entomological excursion on Sunday. The weather, however, was too dry and hot for profitable collecting, and the day was spent in the wood adjoining the house; the party dispersed on Monday morning, after a successful meeting.

A meeting of the Club was held at the Zoological Museum, Tring, on October 26th, 1929, Lord Rothschild in the Chair.

Members present in addition to the Chairman: Mr. Robert Adkin, Mr. H. St. J. Donisthorpe, Prof. E. B. Poulton, Mr. H. Willoughby-Ellis, Mr. J. E. Collin and Mr. W. J. Kaye. Visitors present: Dr. P. Chalmers Mitchell, Mr. S. Edwards, Mr. W. P. Pycraft, Capt. N. D. Riley, Capt. A. F. Hemming, Mr. Philip Graves, Mr. W. Rait Smith, Mr. H. McD. Edelsten, Mr. W. H. T. Tams, Dr. F. A. Dixey, Comm. J. J. Walker, Rev. George Wheeler, Mr. S. S. Flower, Mr. H. E. Andrewes, Dr. S. A. Neave, Mr. E. Ernest Green, Dr. K. Jordan, Mr. G. C. Leman, Mr. A. Hall, Mr. H. T. G. Watkins, Mr. C. J. Wainwright, Mr. John Levick, Mr. C. H. Lankester, Dr. E. A. Cockayne, Dr. J. Waterston, Dr. A. D. Imms.

The guests began to arrive soon after eleven o'clock, and were received by Lord Rothschild. Before and after luncheon they inspected the Lepidoptera exhibited for the purpose of this meeting, and a few of the guests who had not seen the other departments of the Museum, or had not been at Tring for a number of years, were conducted by Lord Rothschild over the Public Museum and the bird collection. The Public Museum (i.e. the portion of the Museum open to the general public) contains a general zoological collection and is rich in many choice specimens and in certain special groups, such as Antelopes, Cassowaries and Giant Tortoises. The exhibition of Lepidoptera consisted of 109 drawers of British Sphingidae and Bombyces (in the old wide sense), a drawer with four British black *Papilio machaon*, and the collection of *Delias* arranged in 75 drawers. *Delias*, a genus entirely restricted to the East, occurring from Ceylon and North-West India to the Solomon Islands, contains a large number of species, most of which are characterised by beautiful red markings on the underside of the hindwing, the upperside as a rule having the usual Pierid colouring, white with black outer area. In most species the sexes are nearly alike, as shown in the exhibit; in the males the black areas on the upperside being on the whole rather more restricted than in the females. But very conspicuous sexual dimorphism also occurs, particularly in New Guinea, a country where the species are singularly numerous in the mountains, more so than anywhere else, as was well demonstrated by the exhibit. The collection contains nearly all the species and subspecies known, and quite a number of them are represented in no other collection but that at Tring, as for instance *Delias inexpectata*, *D. klossi*, and *D. wollastoni*, each of which Lord Rothschild described from a single specimen captured by Mr. Boden Kloss in the 'Pigmy Country' in Dutch New Guinea.

The British Lepidoptera exhibited are especially remarkable for the numerous melanisms and the great variety of individual aberrations. Each species is accompanied by the parasites which are known to infest the eggs or caterpillars. The four British black *P. machaon* comprise both sexes.

Luncheon was served at one o'clock, after which the Entomological Section of the Museum was again much enjoyed, and the members and guests departed in the late afternoon.—H. Willoughby Ellis, *Hon. Sec.*

Yorkshire Naturalists' Union: Entomological Section.—The Annual Meeting was held in the rooms of the Y.M.C.A. at Leeds on October 19th, the President, J. M. Brown, F.L.S., F.E.S., in the Chair. The attendance was much smaller than usual. Reference was made to the loss the Section had sustained in the recent death of Dr. O. E. Croft, F.E.S., whose comparative exhibits of British and Continental Lepidoptera had been one of the helpful features at past meetings. The afternoon, as usual, was devoted to exhibits, the most interesting of which were:—

Coleoptera. By Mr. M. L. Thompson: *Patrobus assimilis* Chand., *Arpedium brachypterum* Gr. and *Stenus foveicollis* Kr., from Baugh Fell; *Pterostichus lepidus* F., moor near Pickering; *Agabus congener* Payk., from the Cheviots; *Paramecosoma melanocephalum* Hbst., from Glaisdale; *Rhynchites nanus* Payk., from Sandburn Wood, near York. By E. G. Bayford: *Rhagium sycophanta* Schr., a denuded specimen taken some years ago in the G.N. Plant at Doncaster, no doubt imported in timber; *Rhagium inquisitor* L., a specimen which fell on the neck of a miner whilst at work in Rockingham Colliery, Birdwell, no doubt having emerged from a pit prop. By W. D. Hincks: *Limonius aeruginosus* Oliv., *Hypnoides dermestoides* Hbst. and var. *tetragraphus* Germ., *Syntomium aeneum* Müll. and *Anthribus variegatus* Geoff., from Sandburn Wood; *Araeocerus fasciculatus* Deg., imported into Leeds in cocoa, and a case of exotic *Brachyderinae* showing many striking forms. By Mr. J. M. Brown: A dark, dirty green variety of *Cicindela campestris* L. from Dunkery Beacon, and Yorkshire specimens of *Elater balteatus* L. and *Pyrochroa serraticornis* Scop.

Hemiptera. By Mr. M. L. Thompson: *Salda c-album* Fieb., from the Cheviots; *S. scotica* Curt., from the Cheviots and Upper Weardale; *S. cincta* H.-S. and *Orthotylus flavosparsus* Sahlb. from Eston, in Cleveland; *Plesiodema pinetellum* Zett., from Sandburn Wood; *Corixa carinata* Sahlb., from Upper Weardale. By Mr. J. M. Brown: Several species from the South of England and the following from Yorkshire, which are either new to or rare in the county. *Elasmucha grisea* auct., *Rhacognathus punctatus* L., *Megaloceraea linearis, Lygus spinolae* Mey.; and a series of colour variations in *Capsus ruber* from the South of England.

Homoptera. By Mr. W. L. Thompson: *Tettigonia viridis* L. and *Megamelus notula* Germ., from the Cheviots. By Mr. J. M. Brown: *Graphocraerus ventralis, Delphax discreta* and *Megamelus fieberi*. Mr. Whitehead, who has begun an intensive study of the Ephemeroptera, a group hitherto almost entirely neglected in Yorkshire, exhibited a number of species and gave a short account of the methods of observation and study which he had adopted.

Mr. J. M. Brown also exhibited representative species of the following orders:—

Orthoptera. *Nemobius sylvestris, Phasgonura viridissima, Merioptera albopunctata, Pholidoptera griseoaptera, Meconema thalassina, Leptophyes punctatissima, Chorthippus parallelus,* and *Stauroderus bicolor,* mostly from the South of England. Plecoptera.—Yorkshire species of *Leuctra, Chloroperla, Isopteryx, Taeniopteryx, Perlodes* and *Perla*. Psocoptera.—*Psocus nebulosus,* the largest Yorkshire species from Driffield.

For the first time there were no exhibits of Lepidoptera, but Mr. B. Morley gave an interesting account of many years' continuous in-breeding of the buff ermine moth, *Spilosoma lubricipeda*, resulting in weakened vitality, malformation and, finally, total sterility.

The evening meeting was spent in the election of officers for the coming year and the consideration of the Reports on the Year's Work in the various Orders.

These agreed in recording disappointing results and a marked diminution in numbers even of the usually common species, notwithstanding the fine dry weather which had characterised the collecting period. The result was that in few orders was there anything noteworthy, the chief exceptions being in the Hemiptera and Hymenoptera (Braconidae), which had provided some interesting additions to the Yorkshire List.—E. G. Bayford.

Lancashire and Cheshire Entomological Society: *Tuesday, October 15th, 1929.*—The President, Dr. Willoughby Gardner, in the Chair.

It was reported that the Chester Society of Natural Science, Literature and Art had awarded to Mr. S. Gordon Smith the Charles Kingsley Medal for his contributions to the knowledge of the Lepidoptera in the Chester Society's district, and to Professor R. Newstead the Mary Kingsley Medal in recognition of his contribution to our knowledge of the relation between insects and tropical diseases, and a vote of congratulation to each of these members upon the honour conferred upon him was carried with acclamation.

The attention of the Meeting was next directed to the exhibition by members of the season's captures, in the course of which the adverse effect on collecting of the dry, hot weather was freely commented upon, many species having emerged considerably in advance of the normal dates for their appearance.

Exhibits.—By Mr. W. Buckley: series of *Cyclopides palaemon* and *Ematurga atomaria* (yellow ground colour) from Northampton, a bred series of *Lasiocampa quercus* from Lindlow Common, and a fine specimen of *Acherontia atropos* from Nevin, N. Wales. By Mr. B. H. Crabtree: a bred series of *Spilosoma menthastri* from Mullion Cove, with heavy markings showing a decided tendency to form a band across the middle of the forewings. By Mr. R. Tait: bred series of *Boarmia consortaria* from Tilgate Forest and of *Agrotis ashworthii* from Penmaenmawr larvae. From Church Stretton *Noctua rhomboidea, Aplecta nebulosa, Agrotis exclamationis* (varied) and specimens of *Aplecta herbida* and *Noctua ditrapezium.* Also *Argynnis adippe, Cymatophora fluctuosa* and *Aplecta tincta* from Wyre Forest. By Mr. W. Mansbridge: series of *Boarmia repandata*, showing variation in the species, from Delamere Forest, and very dark type forms and varieties *nigra* and *nigro-ochrea* from Western Ireland. *Eupithecia pygmaeata, E. jasioneata, Chloroclystis rectangulata, Ypsipetes impluviata* and *Cymatophora duplaris* (melanic forms) from West Lancashire. Also *Opostega crepusculella* from Woodvale, a species new to the Lancashire County list. By Miss J. L. M. Bird: series of *Melitaea athalia, M. aurinia, Hydrelia uncula* and *Acidalia imitaria* from North Devon. By Mr. H. W. Wilson: bred series of *Lasiocampa trifolii, Dasychira fascelina, Agrotis praecox, A. tritici* (ranging from very pale to melanic forms), *Triphaena fimbria, Ennomos alniaria*; captured series of *Agrotis vestigialis* and *Hydraecia paludis,* and a specimen of *Hipocrita jacobaeae* with smoky hindwings, all from the sandhills of South-West Lancashire. From South Devon bred series of *Celastrina argiolus, Lobophora viretata* and *Dasychira pudibunda,* and a variable series of *Pararge aegeria* bred from winter pupae. By Mr. R. Wilding: series of *Coenonympha davus* from North Wales and *Hipparchia semele* from Lancashire sandhills and the Coleopteron *Cicindela sylvatica* from Bournemouth. By Mr. R. N. Snell: series of *Hemaris fuciformis, H. tityus* and *Notodonta trepida* from the New Forest; *Nola strigula* and *Angerona prunaria* (varied) from Abbot's Wood. From Wirral, bred series of *Drepana falcataria* and *Mamestra pisi,* and specimens of *Pachys betularia* intermediate between *doubledayaria* and the type. By Mr. S. Gordon Smith: a case showing the life history of *Catocala nupta,* the specimens mounted on bark to demonstrate the protective colouring of ovum, larva and imago. Mr. A. H. Williams, a junior member, exhibited a

nice *Lasiocampa quercus,* variety *olivaceo-fasciata,* bred from a larva taken at Formby. Mr. H. B. Prince brought an exhibit of species of *Papilio, Caligo* and *Morpho* from the Amazon, collected by the Rev. A. Miles Moss.—H. W. Wilson, *Hon. Secretary.*

Entomological Society of London: *Wednesday, October 16th,* 1929.—Dr. K. Jordan, President, in the Chair.

The President announced the deaths of the Rev. Alfred Fuller and of Mr. H. C. Robinson, Fellows of the Society.

Mr. H. Donisthorpe exhibited and made remarks upon some rare Coleoptera from Windsor Forest. Brigadier-General B. H. Cooke, C.M.G., D.S.O., exhibited and made remarks upon some rare Moths from Spain. Professor E. B. Poulton, F.R.S., communicated the following notes from various correspondents: (1) The cocoon-formation by a parasite of *D. chrysippus* larva observed by Dr. W. A. Lamborn. (2) The larva of *Ch. elpenor* carried off by a Long-tailed Field-Mouse, observed at Wisley by Mr. G. Fox Wilson. (3) Dr. G. D. H. Carpenter on the courtship of the Danaine butterfly *Amauris psyttalea.* (4) Dr. G. D. H. Carpenter's further notes on birds and insects. (5) Further notes on the attacks of *Pangonia* in India, by Professor T. Bainbrigge Fletcher and Mr. C. E. Andrews. (6) *Argynnis pandora* taken on a ship in the Mediterranean by Mr. H. Savill. (7) Male and female *Charaxes eudoxus* captured in Sierra Leone (1910) by the late Lieut. C. A. Foster. Mr. H. M. Edelsten exhibited and made remarks upon an early figure of *Chrysophanus dispar* Haw.

Wednesday, November 6th, 1929.—Mr. J. E. Collin, Vice-President, in the Chair.

The following were elected Fellows of the Society: Miss Lucy I. Clarkson, Apipucos, Recife, (Pernambuco), Brazil; W. Cook, 84 Walnut Tree Avenue, Cambridge; Miss Winifred P. K. Hughes, 83 Bay Road, Sandringham, Victoria, Australia; A. Pickles, B.Sc., 16 Cambridge Street, Clayton, Bradford; Rev. R. Simpson, M.Sc., Cranleigh School, Surrey.

The proposed amendment to the Bye-Laws, Chapter XII—Library Regulations, to be considered at a Special Meeting on December 4th, were read for the first time.

Mr. L. W. Newman exhibited some Lepidoptera from the Klondyke. Dr. Hugh Scott exhibited and made remarks upon the life history of the South African beetle *Urodon lilii* Fabr., and on the accidental transport of certain South African insects to Great Britain by human agency. Mr. Archibald G. B. Russell exhibited varieties of British Lepidoptera. M. E. B. Ford exhibited specimens of *Heodes phlaeas* captured in the Himalayas by Mr. H. G. Champion, M.A., F.E.S. Professor E. B. Poulton, F.R.S., communicated: (1) On behalf of Miss Vinall, *Charaxes* and other butterflies taken together on manure at Bongandanga, Belgian Congo; (2) on behalf of Mr. W. C. Simmons, F.G.S., further notes on the larva of *Papilio d. dardanus* Brown, at Entebbe; (3) on behalf of Professor T. Bainbrigge Fletcher, Notes on Butterfly Migration, Bird attacks on Butterflies, etc.; (4) on behalf of Colonel G. H. Evans, Bees taken sleeping in the flowers of the orchid *Serapias cordigera* at Valescure; (5) on behalf of Miss Vinall, the larva of the Elaterid beetle, *Tetralobus flabellicornis* L. taken from a termitarium at Bongandanga. Mr. E. B. Ashby exhibited varieties of French butterflies.

Mr. L. G. Higgins, F.R.C.S., called attention to the desirability of producing an authoritative list of European butterflies.—S. A. Neave, *Hon. Sec.*

INDEX.

INDEX TO CONTRIBUTORS.

GENERAL INDEX.

PAGE

SPECIAL INDEX.

[For the new genera, species, etc., described see pp. xv and xvi.]

COLEOPTERA.

HYMENOPTERA.

LEPIDOPTERA.

NEUROPTERA.

ODONATA.

ORTHOPTERA.

PLECOPTERA.

PROTURA.

PSOCOPTERA.

ADDITIONS TO THE BRITISH INSECT FAUNA BROUGHT FORWARD OR NOTICED IN THIS VOLUME.

PLECOPTERA.

PROTURA. PAGE

PSOCOPTERA.

LIST OF NEW GENERA, SPECIES, ETC., DESCRIBED IN THIS VOLUME.

COLEOPTERA. PAGE

COLLEMBOLA.

DIPTERA.

GENERA.

SPECIES.

EMBIOPTERA.

EPHEMEROPTERA.

GENUS.

SPECIES.

HEMIPTERA.

HYMENOPTERA.

LEPIDOPTERA.

ODONATA.

PLECOPTERA.

PSOCOPTERA.

THYSANOPTERA.

EXPLANATION OF PLATES.

Plate I.—Genitalia of *Coleophora* (see pp. 3, 4).
,, II.—Ova of Hemiptera-Heteroptera (see pp. 34-38).
,, III.
,, IV. } Views in Kurdistan (see pp. 69-81).
,, V.—View in Kurdistan : *Olivierina extensa* Ol. and *Nina ephemera* Geoff. (see pp. 69-81).
,, VI.—The British species of *Leuctra* (see pp. 128-134).
,, VII.—The British species of *Capnia* (see pp. 128-134).
,, VIII.—Three Races of *Chrysophanus dispar* (see pp. 197-8).
,, IX.—*Sphex namkumensis* n. sp. (see pp. 232-3).
,, A.—Coleoptera new to the British List, 1913-1929 (see p. 186 et seq.).

ERRATA.

Page 6, top line, *for* ' Palearctic ' *read* ' Palaearctic'.
,, ,, line 4 from bottom, ,, ' *obuscata*' read ' *obfuscata.*'
,, 43, ,, 24 ,, top, ,, ' BUTTERLIES ' *read* ' BUTTERFLIES.'
,, 46, bottom line, ,, ' GROSVENDR ' *read* ' GROSVENOR.'
,, 51, ,, 13 ,, ,, ,, ' intects ' *read* ' insects.'
,, ,, ,, 23 ,, ,, ,, ' association ' read ' associations.'
,, 79, ,, 20 ,, ,, ,, ' *Crytocephalus* ' read ' *Cryptocephalus.*'
,, 80, middle line of footnote, ,, ' speeies ' *read* ' species.'
,, 82, line 20 from top, ,, ' *Nine* ' read ' *Nina.*'
,, 91, ,, 9 ,, bottom, ,, ' Scott ' *read* ' Stott.'
,, 93, ,, 10 ,, top, ,, ' *avenicus* ' read ' *avenius.*'
,, 93, ,, 6 ,, bottom, ,, ' April 14th ' *read* ' March 14th.'
,, 102, ,, 10 ,, ,, ,, ' Larve ' *read* ' Larves.'
,, 123, ,, 10 ,, ,, ,, ' Phyothrips ' *read* ' Physothrips.'
,, 138, ,, 6 ,, top, ,, ' confined ' *read* ' confirmed.'
,, 139, ,, 8 ,, ,, ,, ' Genofta ' *read* ' Gentofte.'
,, 146, ,, 15 ,, ,, ,, ' classificatin ' read ' classification.'
,, 147, ,, 25 ,, ,, ,, ' sysytem ' *read* ' system.'
,, 162, line 8 from bottom (not counting footnote), for June 5th read May 1st.

[The report of the meeting on June 5th is on p. 185.]

,, 179, line 3 from top, *for* ' W. D. HINDES ' *read* ' W. D. HINCKS.'
,, 182, ,, 23 ,, ,, ,, ' 1899, p. 70 ' *read* ' 1899, p. 69.'
,, 188, ,, 15 ,, ,, ,, ' Ol.' *read* ' Oliveira.'
,, 213, ,, 15 ,, ,, ,, ' 1880 ' *read* ' 1800.'
,, 238, ,, 15 ,, ,, ,, ' as long at ' *read* ' as long as.'
,, ,, last paragraph, for amended form, see p. 244.
,, 239, line 3 from bottom, *for* ' **augustiformis** ' *read* ' **angustiformis**.'
,, 240, ,, 5 & 6 ,, top, ,, ' shagreaned ' *read* ' shagreened.'
,, ,, ,, 12 ,, ,, *after* ' Plate ' *insert* ' B.'